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BULLETIN OF THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

Vol. VI LANCASTER, PA., SEPTEMBER, 1915 No. 1

ANNOUNCEMENT

Ready in September

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By ALEXANDER S. LANGSDORF, M.M.E.

Professor of Electrical Engineering and Dean of the Schools of Engineering and Architecture, Washington University (St. Louis).

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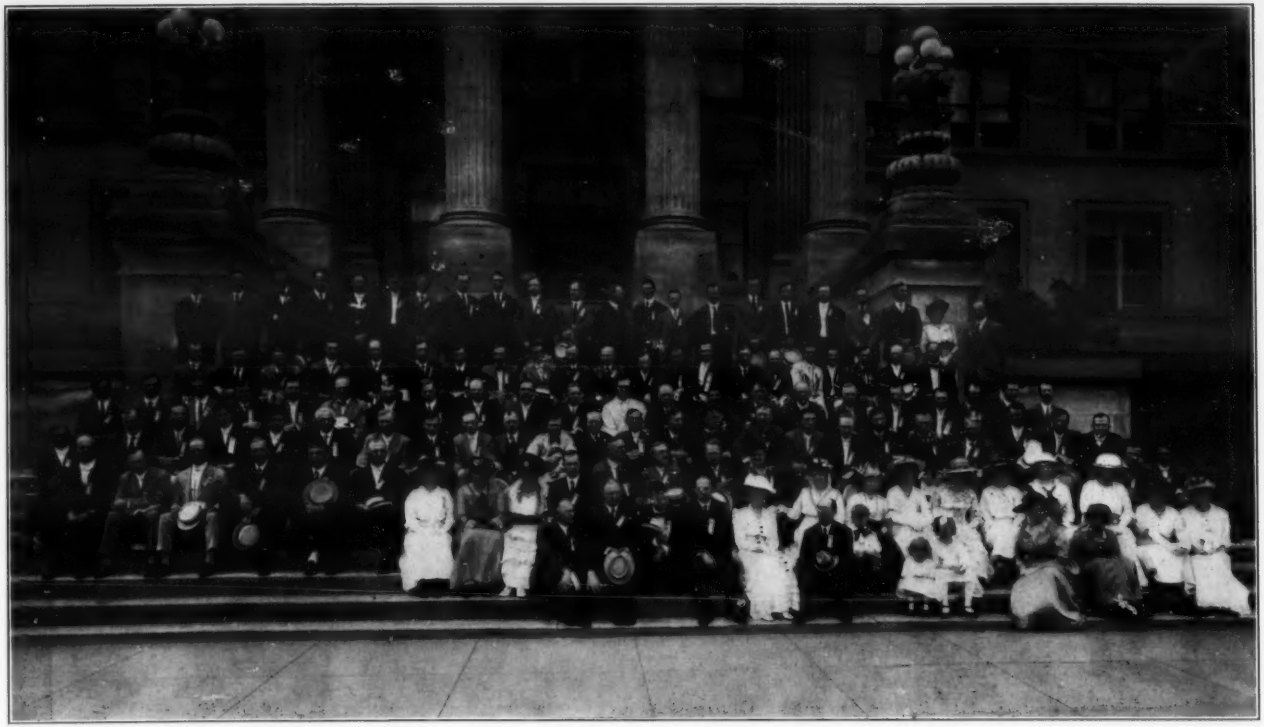

BULLETIN

OF THE

Society for the Promotion of Engineering Education

Published under the supervision of the Publication Committee:

H. S. JACOBY, ANSON MARSTON, F. L. BISHOP, *Editor*.

Address all communications to the Editor, University of Pittsburgh, Pittsburgh, Pa.

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EDITORIALS.

The most noteworthy action taken by the Society at its recent annual meeting was the adoption of the report of a special Committee on Committees which had been appointed by the Council at the Princeton meeting.

While the standing committees had done splendid work in previous years their reports varied considerably in character and influence, indicating to some extent a lack of system and comprehensive purpose. Sometimes the task undertaken by a committee in a single year was so large that nearly all the time was devoted to collecting material, and but little to its analysis and discussion. A voluminous report was naturally followed by a period of inactivity. Frequently the reports led to no definite conclusion nor to subsequent action by the Society.

These remarks are not intended to disparage what has been accomplished in the past but merely to indicate the limitations to which the committee work of this as well as of other societies has been subjected. One has only to refer to previous volumes of the PROCEEDINGS to observe numerous evidences of unselfish devotion to the interests of the Society by members who served on its committees either as chairmen or otherwise.

The principal merit of the report of the Committee on Committees lies in the fact that it is based on the fundamental principles which have guided the work of the American Railway Engineering Association and which made possible its remarkably successful career. The adoption of the report referred to in the first paragraph was immediately followed by the organization of the committees named on another page of the BULLETIN and by the assignment of specific work for the ensuing year. In making these assignments some topics were selected on account of their timeliness, others as preliminary to future work, and still others to follow up what was done previously.

Since each topic assigned has been so strictly limited in scope, and the Secretary's office is ready to give clerical aid, it

is hoped that the possibility of securing definite results of real value without burdensome labor on the part of any committee, will afford a new incentive to the most hearty coöperation by all the committees. When information is requested for the use of any committee it will materially lighten labor if the members will respond promptly.

It is confidently expected that the series of reports thus produced will furnish the principal material for discussion and action at the next annual meeting. Every member will rejoice if this reorganization of the committee work of the Society will prove to be the beginning of a new era of helpful service toward the development of engineering education in America.

H. S. JACOBY.

Impressions of the Ames Meeting.—In this number we are printing some "impressions" as received from members present. Space does not permit the presentation of all that might be said on the subject, but at least one voice from each institution represented can be heard through the medium of these columns. These impressions are worth while for several reasons: They convey to our hosts some idea of the appreciation of the excellent plans made and executed for our benefit; they must cause many to resolve to miss no more of the meetings; and not least of all they bring to the officers in charge of the program suggestions for future meetings that cannot help but make each meeting better than its predecessor, if they are carefully considered. In this respect they are helpful only to the extent that they are critical.

One of the most noteworthy features was the work of the local committee. Too much credit cannot be given to the men and women who gave so much time and thought to every detail of the plans. A guide book containing the program of social events as well as a map of the campus, a folder giving a description of the trips and other matters of information were only a few of the outward evidences of their careful thought. No detail was overlooked. The wholehearted hospitality of

our hosts and the welcome we received must have made every visitor feel at home.

The attendance was only eleven less than at Princeton, which is quite striking when the location of the two schools with reference to center of gravity of the membership is considered. It shows that the meetings are important enough to attract the membership even though long distances must be traveled. It also shows a degree of activity and progressiveness on the part of the western schools perhaps not fully appreciated.

NEW MEMBERS.

ALLEE, W. G., Instructor in Physics, Kansas State Agricultural College, Manhattan, Kans. 1915

BAEBENROTH, A. C., Professor of English, Head, Dept. of English, L. C. Smith College of Applied Science, Syracuse University, Syracuse, N. Y. 1915

BARTHOLOMEW, H. C., Associate Professor of Electrical Engineering, Iowa State College, Ames, Ia. 1915

BEVAN, W. A., Assistant Professor of Physics, Oregon Agricultural College, Corvallis, Ore. 1915

BIRD, R. M., Professor of Chemistry, University of Virginia, University, Va. 1915

COSTELLOE, M. F. P., Associate Professor of Agricultural Engineering, Iowa State College, Ames, Ia. 1915

DAVIDSON, J. B., Professor Agricultural Engineering, Iowa State College, Ames, Ia. 1915

FLOYD, E. V., Assistant Professor of Physics, Kansas State Agricultural College, Manhattan, Kans. 1915

GRASTER, J. S., Associate Professor of Economics and Geology, University of Virginia, University, Va. 1915

HAY, E. D., Professor of Drawing and Machine Design, Oshkosh Normal School, Oshkosh, Wis. 1915

HEWITT, C. E., Dean of Engineering, New Hampshire College of A. & M. Arts, Durham, N. H. 1915

HODSON, L. C., Associate Professor of Mining Engineering, Iowa State College, Ames, Ia. 1915

LYNCH, D. E., Instructor in Forging, Kansas State Agricultural College, Manhattan, Kans. 1915

MACARTHUR, J. R., Associate Professor of English Language, Kansas State Agricultural College, Manhattan, Kans. 1915

MORRIS, C. C., Assistant to Dean. Professor of Mathematics, College of Engineering, The Ohio State University, Columbus, O. 1915
NEWELL, F. H., Professor of Civil Engineering, University of Illinois, Urbana, Ill. 1915
OLSON, O. A., Instructor in Mechanical Drawing, Iowa State College, Ames, Ia. 1915
PATTEN, W. E., Professor of Civil Engineering, Government Institute of Technology, Shanghai, China 1915
PLAGGE, H. J., Assistant Professor of Physics, Iowa State College, Ames, Ia. 1915
RABER, B. F., Associate Professor of Mechanical Engineering, University of Nebraska, Lincoln, Nebr. 1915
ROBINSON, M. B., Instructor in Coördination, University of Cincinnati, Cincinnati, O. 1915
WALTER, J. E., Professor of Mechanical Engineering, Highland Park College, Des Moines, Ia. 1915
WEINBACH, M. P., Assistant Professor of Electrical Engineering, University of Missouri, Columbia, Mo. 1915
CARNEGIE INSTITUTE OF TECHNOLOGY, Pittsburgh, Pa., A. Hamerschlag, Director 1915

APPLICATIONS FOR MEMBERSHIP.

AYDELOTTE, FRANK, Professor of English, Massachusetts Institute of Technology, Boston, Mass. 1915
PRATT, H. B., Test Engineer, Public Service Commission of Pennsylvania, Pittsburgh, Pa. 1915

PERSONAL.

Professor W. S. Franklin, for many years professor of physics at Lehigh University, has resigned. He will spend a part of the year lecturing at various colleges and universities. A note from President Drinker stated that the vacancy caused by Professor Franklin's resignation had not been filled.

IMPRESSIONS OF THE AMES MEETING.

I feel that very much was accomplished at the Ames meeting. The work of the Institutional Delegates and the inauguration of the plans of the Committee on Committees was

especially noteworthy, working a new era in the development of the S. P. E. E.

I am more than ever impressed with the importance of holding our meetings at points somewhat removed from the main thoroughfares. It seems to me that the Princeton and Ames meetings were ideal in this respect, making possible a much more intimate exchange of thought.

G. C. ANTHONY.

I get more from the personal intercourse with individual members and the discussions than from the formal papers. It seems to me to be a reflection on one's intelligence to listen to someone read a paper, a printed copy of which is available. My suggestion is to omit those readings and give the time to discussion.

FRED. E. AYER.

The attendance was very creditable, and the arrangements were entirely satisfactory. The interest was good throughout all sessions. The reorganization of the committees was a distinct step in advance, and the new plans deserve the cordial support of all members.

IRA O. BAKER.

I was very much interested in the papers on the teaching of mechanics and physics. I think that the mechanics men and the physics men ought to get together and agree on the definition of mass and the use of the absolute unit of force—the poundal. I was also very much interested in Dr. Mann's paper on grades of students.

W. A. BEVAN.

The Ames meeting was of pleasure and profit to me, although I am sure that the future meetings can be made of much more value because of the committees which were appointed.

D. W. BLAKESLEE.

IMPRESSIONS OF THE AMES MEETING.

Renewing old friendships and forming new ones is always an important part of the S. P. E. E. meetings for me. The Ames meeting was planned especially well to promote intercourse between members and between the visitors and their hosts.

B. B. BRACKETT.

One of the pleasures, probably the most enjoyable and beneficial that I derived from the Ames meeting was getting personally acquainted with men for whose written opinions and ideas concerning the engineering profession, I entertain high respect.

If you will permit a suggestion from one of the new members, I think the presentation of a few papers bearing vitally on the betterment of engineering education and with more time set aside for discussion would enhance the value of the meetings; the rest of the time if devoted to personal association and informal exchange of ideas would be enjoyable and valuable.

I think the management of the Ames meeting deserves grateful thanks from all the members of the Society.

G. M. BRAUNE.

I found the Ames meeting very enjoyable and profitable and I sincerely hope that future arrangements will be such as will prevent its again coinciding with the meeting of the A. I. E. E. Indeed it seems very unfortunate that it should conflict with any of the other national society meetings, as such conflicts are sure to keep many persons away.

I should have been glad if there had been some discussion of instruction along electrical engineering lines and hope that the scheme suggested at the meeting for sectionalizing one session may be tried in the future.

The general adoption of the committee report system as furnishing the principal subject matter for the meeting, seems a most promising change, and if the papers will be distributed in advance of the meeting, at least to those who are to be in

attendance, and their presentation can be limited to a carefully prepared abstract still more interesting meetings may be hoped for in the future.

F. C. CALDWELL.

I was favorably impressed by the interest manifested by the various educational institutions in the work of the Society as evidenced by the large number of institutional delegates present. The Society with its large number of standing committees should be able to render valuable assistance to institutions if they will take advantage of their opportunity. The institutional delegates make it possible to bring institutions and society together with but little formality.

C. H. CROUCH.

A splendid meeting in a splendid place of men devoted to the best ideals of engineering education. I was impressed by what seemed to be the unanimous spirit of the meeting and the appreciation of the need for a more broadly educated engineer, deeply interested in and understanding administrative, financial, economic, social and human questions as well as strictly technical problems.

C. L. CORY.

I was much pleased with and intensely interested in most of the phases of the Ames meeting. I was especially struck with the idea of fitting the subject to the man, in order to decrease the student mortality. Personally I believe very strongly that previous preparation and training have fully as much to do with mortality as methods of presentation in classes in our technical schools.

I should like to see a committee whose function it is to report on secondary education from a technical standpoint. Dr. Mann's work was fine; let us have much more of it.

A. R. CULLIMORE.

The 1915 meeting of the S. P. E. E. was the first one attended by the writer but will not be the last. The trip was

well worth while from any standpoint; from the teaching ideas gained and the enthusiasm aroused; from the social side and the acquaintances made; and from the ideas gained from an inspection of the very progressive state college of Iowa.

While the meetings were very interesting, the writer believes that better results would be obtained if the sectional meetings were held for special subjects, reserving the general meetings for general subjects.

If better committee work could be done and better digested reports presented much time would be saved.

R. P. DAVIS.

One of the most significant aspects of the Ames meeting was the organization and formulation of the work of the institutional delegates. The great increase in the membership of the Society in these last years largely smothered its original aim of unifying and standardizing engineering education, in which field the early years of the Society were most fruitful. But this new movement which has been now entered upon bids fair to restore and enlarge on all its former activities in this important field in a way to make the Society continue to be the clearing house for the exchange and discussion of engineering education in all its phases.

H. T. EDDY.

I have always regarded the S. P. E. E. as having good reason for its existence, although there has always been the feeling that it had not truly *found its pace*. Perhaps this was largely because of its comparative youth. At the Ames meeting I was particularly impressed by the earnestness of all those in attendance. It seems that the Society has *found its pace*.

E. J. FERMIER.

We had a fine meeting at Ames. The renewal of old acquaintances, the making of new ones and the mutual interchange of ideas will furnish inspiration for the coming session.

I thoroughly enjoyed the topics presented, particularly Dr. Mann's talk and the papers relating to cost of instruction. It is to be regretted that lack of time curtailed some of the discussions.

R. W. GAY.

I was delighted with the Ames meeting of the S. P. E. E. It renewed my belief that the S. P. E. E. stands very high among societies as a thorough success in securing wide-awake meetings at which there is genuine earnest discussion of important matters and at the same time and place promoting social fellowship among the members.

JOHN F. HAYFORD.

The strongest impression was made by numerous evidences in discussions and personal conversations, that opportunities for useful service by the Society, are not diminishing, and that the reorganization of the committee work gives excellent promise for the future.

HENRY S. JACOBY.

I consider the Ames meeting the most successful in every way. The address of Dr. Mann and the discussion of the various papers were the most interesting to me. I believe an improvement would be to lengthen the time for such discussions and to decrease the number of papers.

H. N. LENDALL.

The most encouraging suggestion at the Ames meeting was that of Professor G. W. Stewart in regard to the problem of teaching mechanics. If we could all realize the importance of distinguishing between philosophical and metaphysical discussions of the bases of mechanics and the problem of teaching mechanics effectively to engineers, much would be done to lessen the confusion which now exists amongst engineers in regard to this fundamental subject.

C. R. MANN.

IMPRESSIONS OF THE AMES MEETING.

The Ames meeting, as I saw it, was characterized by a very fine fraternal spirit and a desire to secure results and reach definite conclusions through coöperative efforts. To this end I suggest more diligent and careful work by the committees.

J. F. MERRILL.

The important feature of the meeting is the opportunity to get acquainted and to learn of the other fellow's troubles.

The meetings were too crowded with papers, leaving little room for deliberate discussion. Papers in print should not be read in full before the meeting, but the author should simply in a few words place the gist of the paper before the audience and invite comment or discussion. On the whole, *a good meeting.*

E. J. MCCAUSTLAND.

It is a notorious fact that cities often suffer reaction after a convention has been held. Here at Ames the after effect of the meeting of the S. P. E. E. is good in every particular. The presence of so many engineering educators was a help to us.

R. A. PEARSON.

The Ames meeting demonstrated beyond doubt that successful meetings can be held "west of the Mississippi" as well as in the favorite locality, the east.

The fellowship, inspiration and enthusing qualities which characterize all S. P. E. E. meetings were present at Ames. The hospitality and methods of conducting the meeting were much to the credit of the Iowa State College.

A considerable number of the members present felt that the papers were too long and the discussions too meager. Five or ten minutes only should be allowed for the abstract of a paper and at least the same amount of time for discussion.

A. A. POTTER.

Favorably impressed with the provision made for the entertainment of the members by the State College.

WM. G. RAYMOND.

IMPRESSIONS OF THE AMES MEETING.

My most favorable impression of the Ames meeting resulted from the admirable arrangements for the entertainment of the members and from the fact that there were few things to distract the attention of those present from the primary purpose of the meeting. The success of the meetings at Princeton and at Ames indicates the advantage of holding meetings in comparatively small college towns rather than in large cities where outside attractions may detract from the interest of the meeting itself.

A number of the papers which were presented were very interesting. Perhaps the most important action taken at the meeting was that which had to do with the elaboration of the scheme of committee work and reports. I think that the Ames meeting was distinctly worth while and I enjoyed the occasion immensely. C. RUSS RICHARDS.

As a representative of a corporation which employs a very large number of engineering graduates, I was, naturally, most impressed by the report of progress made by Dr. Mann. A study such as he is making cannot be other than profitable to all who are interested in advancing engineering education.

A. L. ROHRER.

A most satisfactory meeting. Ideal for increasing the mutual acquaintance of the membership and for the informal interchange of ideas and experience. Sessions would be stronger if papers were read in abstract. W. B. RUSSELL.

The Ames meeting is the first that I have attended, although I am listed as a charter member of the S. P. E. E.. My most distinct impression was of the spirit of service which prevailed and the apparent total absence of self-seeking and manipulation for preferment. I had not previously known these men as a body, and am proud to "belong." O. V. P. STOUT.

To me the Ames meeting was one where real work was accomplished. It seems as though the committee work was being systematized in a way that promises well for the future,

and which indicates the trend of Society work in the coming years. The local members did their royal work in providing for the comfort of visitors and this did much to promote the atmosphere of good fellowship which was so evident throughout the session. P. F. WALKER.

The annual meeting of the Society was to me especially interesting in several ways. We had not met west of the Mississippi River for a number of years and in consequence there were many new faces at the convention and an opportunity to meet men from sections of the country that are not ordinarily present at the eastern meetings. On the other hand, of course, we did miss many familiar faces of eastern men.

The program was a strong one and well planned, and the papers in many ways, I think, gave evidence of a movement forward in engineering education.

One feature of the meeting, however, that to me was most significant and gave the greatest promise of genuine progress was the report of the constructive study of American education being carried on by the Carnegie Foundation for the Advancement of Teaching and for the allied engineering societies by Dr. Mann.

I cannot close, however, without a word of appreciation of the charming way in which our hosts entertained us.

A. S. WILLISTON.

It seems to me that the "big thing" of any meeting like that at Ames is the opportunity for an interchange of ideas between men from different sections and with different kinds of training. J. F. WILSON.

Have general session in the forenoon for papers of general interest and reports on *any topics* for discussion. Have sectional meetings in afternoon where papers of special concern may be read (and thoroughly thrashed out) with an abstract made for presentation next morning. C. M. WIRICK.

MINUTES OF THE TWENTY-THIRD ANNUAL MEETING.

AMES, IOWA.

JUNE 22 TO JUNE 25, 1915.

The twenty-third annual meeting of the Society for the Promotion of Engineering Education was held at The Iowa State College, Ames, Ia., June 22 to 25, 1915. The sessions were held in the Engineering Assembly, 207, Engineering Hall. Registration headquarters were in Room 212, Engineering Hall.

TUESDAY, JUNE 22.

Afternoon Session.

The meeting was called to order at 2:00 P. M. by President Anson Marston, dean of the division of engineering of The Iowa State College, who introduced President Raymond Allen Pearson of The Iowa State College. President Pearson delivered the address of welcome. Dean Gardner C. Anthony of Tufts College, Past-President, responded for the Society.

The Treasurer, Mr. W. O. Wiley, presented his annual report, which on a motion was received and referred to the Auditing Committee. President Marston then appointed Professors W. S. Rodman, W. B. Russell and J. F. Wilson as the Auditing Committee. A list of twenty-three applicants, which had been approved at a Council meeting held at noon, was favorably acted upon by the Society. One application for institutional membership was also approved.

The Secretary read by title a list of resignations which were ordered accepted when the constitutional requirements had been compiled with.

The President announced the following names of the members of the Committee on Resolutions: Professors F. C. Caldwell, C. H. Crouch and C. E. Magnusson.

President Marston then called for the presentation of the report of the Committee on the Classification of Colleges by Professor C. S. Howe. On motion the report was accepted and the committee continued. In the absence of Mr. Fitzgerald, Chairman of the Joint Committee on Engineering Education, Dean G. C. Anthony read a report of progress. Dr. C. R. Mann then made a special report on this same subject. A discussion of these reports then followed.

Dean C. L. Cory then presented his paper, "The Education of the Future Engineer." A motion was made, seconded and carried that a committee be appointed to investigate conditions relative to the summer employment of engineering instructors.

WEDNESDAY, JUNE 23.

Morning Session.

The meeting was called to order at 9:45 with President Marston in the chair. The Secretary, Dean F. L. Bishop, having a slight attack of tonsillitis, the Assistant Secretary, Professor L. H. Harris, presented the report of the meeting of Council. This report recommended that the Committee on Committees be a standing committee, and that it have general authority over the work of the other committees of the Society. Upon a motion being made and seconded this report was adopted as read. The council also recommended that the report of the Nominating Committee be read at this meeting. The Nominating Committee reported as follows:

For officers to serve for one year:

For President: Henry S. Jacoby, Cornell University.

For First Vice-President: G. R. Chatburn, University of Nebraska.

For Second Vice-President: F. H. Constant, Princeton University.

For Secretary: F. L. Bishop, University of Pittsburgh.

For Treasurer: W. O. Wiley, New York.

For members of the Council to serve for three years: L. P. Breckenridge, Yale University; C. L. Cory, University of California; C. H. Crouch, University of North Dakota; O. P. Hood, Pittsburgh, Pa.; F. P. McKibben, Lehigh University; G. D. Shepardson, University of Minnesota, and J. B. Whitehead, Johns Hopkins University.

On motion the Secretary was instructed to cast a unanimous ballot in favor of all the above candidates.

An invitation from Dean Adolph Shane to visit Highland Park College any time during the week, was then read. Professor E. R. Maurer read the report of the Committee on Teaching Mechanics to Engineering Students. Professor Maurer presided at the meeting during the discussion which followed. Professor D. C. Miller read the report of the Committee on Teaching Physics to Students of Engineering. He also presided at the meeting during the discussion of this report. Professor C. M. Wirick presented an abstract of the report of the Committee on Coöperation with Secondary Schools.

THURSDAY, JUNE 24.

Morning Session.

The meeting was called to order at 9:30 with President Marston in the chair. Professor Wilson reported for the Auditing Committee that the books of the Treasurer were found in good condition, the cash balance tallying with the report made by that officer. On motion it was voted to receive the report and discharge the Committee. In the absence of the Chairman, Professor A. J. Wood, Professor F. A. Fish read the report of the Committee on Statistics. Professor L. B. Spinney then read his paper on "Instruction in Illuminating Engineering." Dean G. C. Anthony presented the report of the Committee on the Standardization of Technical Nomen-

clature. The Secretary reported for the Committee on Improvements in Laboratory Instruction. Professor W. S. Bauer read his paper on "Class and Laboratory Work in Engineering." The meeting was then thrown open for the discussion on laboratory instruction. Two other papers were read before the meeting adjourned. These papers were "The Annual Competition Conducted by the Engineers' Society of Western Pennsylvania," by Dean John H. Leete and "Engineering Thermodynamics at American Colleges" by Dean A. A. Potter. Discussion on these papers was deferred until afternoon.

Afternoon Session.

The afternoon session was called to order at 1:30 with President Marston in the chair. Dean P. F. Walker read his paper on "Methods of Teaching Industrial Management at the University of Kansas." Director B. W. Benedict then presented an illustrated paper on "Shop Instruction at the University of Illinois." Mr. A. S. Kinsey not being present, his paper on "Woodworking for Mechanical Engineering Students" was read by title. After Professor F. G. Higbee read his paper "Coördinating Draughting and Shop Work" and Principal A. S. Williston his paper on "The Architectural Course at Wentworth Institute" the meeting was thrown open for the discussion of these papers.

Annual Dinner—Thursday Evening.

The annual dinner was held in Margaret Hall Gymnasium. Senator A. B. Cummins spoke on behalf of the State of Iowa, and President Marston delivered his presidential address on the subject "The Relation of the Engineering Schools to the Profession, the State, and the Public."

FRIDAY, JUNE 25.

Morning Session.

The Society convened at 9:30 with President Marston in the chair. Professor F. C. Caldwell, chairman of the Committee

on Resolutions, presented the following resolutions which were duly passed:

The Society desires to express its appreciation of the courtesies and favors extended to its members and visiting ladies by the administration and members of the faculty of the Iowa State College and to all others who have contributed to the success of the convention of 1915. Therefore, be it

Resolved: That the thanks of the Society be hereby tendered to President Pearson, Dean Marston, Dean Curtis and the ladies of the faculty for their cordial hospitality; to the local members of the Society for their untiring efforts for the success of the meeting; to the Ames Golf and Country Club, the City Commercial Club, the Holst Hotel management and the Fort Dodge Commercial Club for the very enjoyable entertainment provided; to the Fort Dodge, Des Moines and Southern Railway and the Plymouth Clay Products Company of Fort Dodge for permitting the members of the Society to visit their works; to the State Highway Commission for its thoughtful efforts in our behalf; and to the many who sacrificed their personal comforts in order to provide the members with convenient quarters during their stay.

Professor H. S. Jacoby then presented the report of the Committee on Committees which had been adopted by the Council. It was moved, seconded and carried that the recommendations as presented by the Council be approved. Professor Jacoby also presented to the Society, for its approval, the report of the Institutional Delegates. Report adopted. After the adoption of this report it was moved that no papers received after May first be considered at the annual meetings of the Society, except by unanimous consent of the Program Committee. After a discussion this motion was amended to read "May fifteenth" instead of "May first" and the motion, as amended, was put to a vote and carried.

Dr. J. A. L. Waddell then read a paper "Some Important Questions in Engineering Education" and Director J. F. Hay-

ford his on "Reflections of a Director." These papers were discussed, after which President Marston introduced the president-elect, Professor H. S. Jacoby, who in a few words expressed his appreciation of the great honor conferred upon him. The convention then adjourned *sine die*.

Social Features of the Ames Meeting.

Owing to the widely prevalent belief in the value of the social side of the meetings, an effort was made to emphasize this phase of the program as much as possible consistent with the necessary business. A good start was made when a special car from Chicago to Ames was arranged for. The car was completely filled by members and the occasion added much to the enjoyment of the trip. Automobiles met the train at Ames and conveyed the party to the campus.

Tuesday afternoon a reception was held at the home of President Pearson with President Pearson and Dean Marston as joint hosts. This was the first of the social meetings and preceded by only a few hours the annual smoker at the Ames Golf and Country Club. Special cars carried the party to the club house, which is located about two miles from the campus. Smokes, refreshments, and entertainment made the evening seem short indeed.

Wednesday morning the visiting ladies were taken for an auto ride over the campus and through the city. The men's turn came in the afternoon, which had been set aside for recreation. Two trips had been planned by the local committee, between which it was necessary, though difficult, to choose. One was an auto ride over the Lincoln Highway west with supper at Boone. This provided opportunity to see something of Iowa farm country and also something of the work of the State Highway Commission, of which Dean Marston is chairman. The other trip was made by trolley to Ft. Dodge to inspect industrial and mining operations there, with supper at Ft. Dodge.

Thursday noon the visiting ladies were entertained at a

luncheon given by the ladies of the faculty. A feature of this luncheon was the opportunity given to inspect the Home Economics Building. The luncheon was served in this building and the food prepared by the students specializing in that work.

In the afternoon visiting members and ladies were received at the home of Dean Curtis.

On Thursday evening was held the annual Society dinner—the big event of the meetings. It is an established custom to hold this on the third evening in order that all late comers may have an opportunity to attend. We were especially fortunate in having as the guest of honor, the Hon. A. B. Cummins, United States Senator from Iowa, who spoke on what Dean Marston claimed to be his favorite theme, "Iowa."

Not the least enjoyable of all the social arrangements was the result of the work of the housing committee. All of the visiting members were grouped, in so far as was practicable, in the new dormitory and in Alumni Hall. A good word must also be said for the quality of the food, which was uniformly excellent.

The committee did not say who had the weather in charge, but it was evidently some one in high authority or of great influence, for an unusual stretch of fine weather prevailed.

The trip down from Chicago proved so enjoyable that a special car was arranged for to leave Friday noon for Chicago, postponing until the last the final disbanding of the members.

Attendance at the Convention.

One hundred and seventy-seven members and guests registered at the convention. The names follow, those of institutional delegates and members representing institutions being indicated by asterisks: T. R. Agg, Mrs. T. R. Agg, L. E. Akeley, G. C. Anthony, F. E. Ayer*, I. O. Baker, H. C. Bartholomew, Mrs. H. C. Bartholomew, F. Bass, J. T. Bates, W. C. Bauer, B. W. Benedict, W. A. Bevan, S. W. Beyer*, Mrs. S. W. Beyer, F. L. Bishop*, G. W. Bissell, D. W. Blakeslee,

F. C. Bolton, B. B. Brackett, G. M. Braune, F. C. Caldwell, W. W. Carlson, E. F. Chandler, G. A. Chaney, Mrs. G. A. Chaney, G. R. Chatburn, Mrs. G. R. Chatburn, M. P. Cleghorn, Mrs. M. P. Cleghorn, E. F. Coddington, C. I. Corp, Mrs. C. I. Corp, C. L. Cory*, M. F. P. Costelloe, Mrs. M. F. P. Costelloe, C. L. Crandall*, Mrs. C. L. Crandall, C. H. Crouch*, R. W. Crum, Mrs. R. W. Crum, J. B. Davidson, Mrs. J. B. Davidson, H. K. Davis, R. P. Davis, J. F. H. Douglas, Mrs. J. F. H. Douglas, F. A. Dragoun, Mrs. F. A. Dragoun, H. T. Eddy, H. S. Evans, M. I. Evinger, D. C. Faber, Mrs. D. C. Faber, J. H. Felgar, O. J. Ferguson, R. H. Fernald, Mrs. R. H. Fernald, E. J. Fermier, F. A. Fish, Mrs. F. A. Fish, B. P. Fleming, Mrs. B. P. Fleming, A. H. Ford, H. C. Ford, Mrs. H. C. Ford, W. S. Franklin, S. L. Galpin, Mrs. S. L. Galpin, J. D. Garver, R. W. Gay, L. H. Harris, Mrs. L. H. Harris, J. F. Hayford*, G. E. Hesse, F. G. Higbee, W. A. Hildreth, A. H. Hoffman, J. D. Hoffman, V. P. Hollister, C. S. Howe*, H. S. Hower, H. S. Jacoby, Mrs. H. S. Jacoby, J. B. Kelley, Mrs. J. B. Kelley, M. A. R. Kelley, E. W. Kellogg, M. S. Ketchum*, A. W. Keuffel, E. E. King, Mrs. E. E. King, J. E. Kirkham, Mrs. J. E. Kirkham, L. C. Kyle, John Leete*, H. N. Lendall*, O. A. Leutwiler, J. J. Long, E. J. McCaustland, G. B. McNair, C. E. Magnusson*, C. R. Mann, A. Marston, Mrs. A. Marston, J. V. Martenus, Mrs. J. V. Martenus, E. R. Maurer, W. H. Meeker, J. F. Merrill*, D. C. Miller, C. C. Morris, B. L. Newkirk, F. D. Newton, C. S. Nichols, Mrs. C. S. Nichols, O. A. Olson, Mrs. O. A. Olson, F. D. Paine, Mrs. F. D. Paine, R. A. Pearson, P. E. Petersen, R. H. Porter, Mrs. R. H. Porter, A. A. Potter*, B. F. Raber, W. G. Raymond, C. E. Reed, H. A. Rice, C. R. Richards, W. J. Risley, F. A. Robbins, Mrs. F. A. Robbins, J. E. Robertson, W. S. Rodman*, A. R. Rohrer, W. B. Russell, W. T. Ryan, Mrs. W. T. Ryan, Daniels Scoates, G. C. Shaad, A. Shane, S. C. Shipley, Mrs. S. C. Shipley, F. H. Sibley, S. L. Simmering, P. K. Slaymaker, H. E. Smith, K. G. Smith, Mrs. K. G. Smith, J. E. Smith, F. P. Spalding*, L. B. Spinney, G. W. Stewart, O. V. P. Stout, I. I. Taylor, Mrs. I. I.

Taylor, J. S. Thompson, F. E. Turneaure, J. W. Votey, H. W. Wagner, Mrs. H. W. Wagner, P. F. Walker*, R. S. Wallis, Mrs. R. S. Wallis, W. O. Wiley, C. C. Williams, A. L. Williston, J. F. Wilson*, Mrs. J. F. Wilson, W. M. Wilson, Mrs. W. M. Wilson, C. M. Wirick, B. H. Witherspoon, W. J. Wohlenberg (177).

MINUTES OF COUNCIL MEETINGS.

Meetings of the Council were held on June 22, 23 and 24. Members who attended one or more sessions were: G. C. Anthony, I. O. Baker, F. L. Bishop, G. R. Chatburn, C. L. Crandall, H. T. Eddy, R. H. Fernald, C. S. Howe, J. F. Hayford, M. S. Ketchum, A. Marston, D. C. Miller, W. G. Raymond, C. R. Richards, F. P. Spalding, F. E. Turneaure, P. F. Walker and W. O. Wiley.

The important motions passed were as follows:

1. That the report of the Committee on Committees be adopted. The report recommended:

(*a*) That a standing Committee of Committees be formed.

(*b*) That the Committee on Committees is to consist of the officers of the Society and two members appointed by the President.

(*c*) That the Committee on Committees is to determine what committees are to be formed to make the work of the Society effective and what specific work is to be assigned to each committee for the ensuing year.

(*d*) That committee work is to be regarded as continuous and that it is not necessary to make a final report on every topic at the close of the year, if more time is necessary to complete the work in a satisfactory manner.

(*e*) That a historical statement, an analysis of the problem, a systematic arrangement of data, and a bibliography of the subject be included in the report as their needs may appear. The diagrammatic representation of facts is to be used as far as practicable.

(*f*) That wherever possible a report should result in the for-

mulation of conclusions to be presented to the Society for adoption.

(*g*) That in sending out questionnaires to the members, the facilities of the Secretary's office are to be used to aid any committee in its work.

(*h*) That the members be requested to make suggestions of topics to be investigated by the several committees of the Society.

2. That the Nominating Committee report, and the election of officers be held at the business session on the morning of Wednesday, June 23.

3. That the Secretary appoint an Assistant Secretary.

4. That the book value of the PROCEEDINGS from 1893 to 1900 be wiped off the assets of the Society, with the exception of the thirty-one complete sets.

5. That the Executive Committee bring in a report providing for the revision of the rules relating to honorary members of the Society.

6. That a letter ballot be taken, amending the Constitution with effect to members in arrears.

7. That it was the sense of Council that this regulation be strictly enforced.

8. That the selection of the 1916 meeting place be decided by Council after the meeting.

The following applicants were recommended to the Society for election and were duly elected: W. G. Allee, A. C. Baebenroth, H. C. Bartholomew, W. A. Bevan, R. M. Bird, M. F. P. Costelloe, J. B. Davidson, E. V. Floyd, J. S. Graster, E. D. Hay, C. E. Hewitt, L. C. Hodson, D. E. Lynch, J. R. Macarthur, C. C. Morris, F. H. Newell, O. A. Olson, W. E. Patten, H. J. Plagge, B. F. Raber, M. B. Robinson, J. E. Walter, M. P. Weinbach (20); Carnegie Institute of Technology.

The following budget of income and expense for the coming year was reported by the Executive Committee, and adopted by the Council:

Estimated Receipts.

From back dues	$1,000
From current dues (individual)	4,600
From current dues (institutional)	490
From advertising	1,000
From sale of publications	200
Total	$7,290

Estimated Expenses.

Annual meeting (Ames 1915)	$ 300
PROCEEDINGS:	
Printing, paper, comp., P. W., binding, packing alterations, mailing, drawing and engraving	1,500
BULLETIN:	
Printing, paper, comp., P. W., alterations, author's and editor's, mailing, drawing and engraving	1,850
Committee expenses	150
Treasurer's honorarium	300
Secretary's honorarium	1,000
Assistant Secretary's honorarium	600
Secretary's clerical assistance	600
Sundry printing	200
Postage and expressage	400
Telephone and telegrams	25
Office supplies (for all offices)	200
Total	$7,125

COUNCIL LETTER BALLOTS TAKEN DURING 1914–15.

September 24, 1914.—L. J. Beaver, F. A. Clark, H. G. Carter, E. C. Gee, T. F. Hickerson, Wm. F. Hogg, C. E. Speirs, L. H. A. Weaver (8).

October 30, 1914.—E. C. Barton, A. F. Barnes, S. L. Brown, L. A. Doggett, J. J. Doland, C. L. Eckel, P. S. Emrick, Carl Crandall, F. A. Wirt, J. B. Morrill (10).

January 11, 1915.—D. W. Blakeslee, Rolland Adelsperger, W. P. Augel, H. E. Dyche, F. A. Foraker, P. J. Freeman, R.

W. Goddard, H. J. Goulding, F. V. Larkin, Wm. A. Luby, J. H. Parkin, W. P. Powers, H. A. Vanderbeek, Erich Hausmann, D. W. Crawford, G. W. Case, J. C. Shutt, S. A. Smith, C. B. Stanton, J. M. Stetson, E. B. Waite, S. R. Wing, H. J. Wolf, L. C. McCandliss, S. B. McCormick, B. G. McNair, J. S. Mathewson, H. B. Meller, R. L. Morrison (29).

March 1, 1915.—T. R. Agg, C. H. Ashton, Hugh Brodie, F. L. Brown, C. W. Coppersmith, L. O. Grondahl, J. D. Garver, G. Goldsmith, Chas. Hancock, R. S. Hawley, P. P. Henshall, L. G. Hoxton, F. E. Jones, C. A. Johnson, J. S. Lapham, S. W. Munn, W. C. McNown, J. L. Newcombe, C. S. Nichols, J. A. Northcott, H. A. Roberts, W. S. Rodman, Thorndike Saville, A. H. Sluss, J. B. Straw, M. F. Trummell, F. A. Thomson, Purdue University (28).

March 16, 1915.—W. F. Allison, C. L. Cory, C. L. Dawes, J. A. deTurk, R. W. French, H. H. Khachadoorian, F. W. Krotzer, R. C. Lye, R. R. Martel, B. L. Remick, F. H. Stevens, H. A. Stringfellow, E. Dean Tanzer, I. I. Taylor, University of Virginia (15).

April 29, 1915.—L. D. Arnett, C. E. Barba, F. D. Crawshaw, H. R. Dougherty, F. A. Dragoun, S. L. Galpin, J. E. Kirkham, R. H. Porter, R. L. Rockwell, Kansas State Agricultural College (10).

May 10, 1915.—G. E. Bray, W. S. Gearhart, Thornton Hayes, F. D. Paine, F. F. Piper (5).

TABLE OF MEMBERSHIP.

Members July 1, 1914:		
Individual		1,353
Institutional		48
Members elected by letter ballot to July 1, 1915:		
Individual	102	
Institutional	3	
Members elected at the Ames meeting:		
Individual	23	
Institutional	1	
Total	129	

Names taken from list:			
Resignations:			
Individual	58		
Institutional	3		
Dropped for non-payment of dues	9		
Deaths	8		
Total	78	78	
Net gain		51	51
Total membership July 1, 1915			1,452

MINUTES OF THE MEETINGS OF INSTITUTIONAL DELEGATES.

The organization meeting of the Institutional Delegates of the Society for the Promotion of Engineering Education was held on Tuesday, June 22, at 4:45 P. M. The meeting was called to order by Vice-President C. Russ Richards, who said:

"It was with great reluctance that I accepted the appointment to preside at the meetings of the institutional delegates. It was with reluctance because of the fact that the University of Illinois, of whose Faculty I am a member, is not an institutional member. About a month or six weeks ago the Secretary, Dean Bishop, wrote me, asking if I would arrange a program for the meetings. It seemed an easy task when I accepted the commission. As I thought it over and attempted to outline a program which would be profitable I found it less simple.

Institutional membership was proposed and provided for at the Minneapolis meeting of the Society two years ago. The former Secretary, Professor Norris, was, I believe, the one man who was most interested in the proposal to provide for this new grade of membership. There were certain arguments in favor of such membership presented at the meeting, and yet I think few of us have a very clear conception of the advantages, purposes or aims of institutional membership.

In giving attention, then, to the organization of a program for these very brief meetings which have been allotted to us, I finally concluded that perhaps two short papers would bring before us the essential features of the institutional member-

ship and the institutional delegate. Consequently, I undertook to enlist the support of some men who might prepare these papers. It seemed to me the first subject which might properly be discussed at these meetings would be the purpose and value of institutional membership—to attempt to get a rather clear record, if possible, in the minutes of the Society regarding this matter. I do not think there has been any definite statement regarding the purpose and value of institutional membership. It seemed to me that the second subject to be discussed would be the duty of the institutional delegate. As I thought over these subjects, it occurred to me that they were topics which should be presented by college presidents, as they are the men who determine whether institutions shall become members, and also designate the institutional delegates. Theoretically, if institutional delegates are to perform any serious function, they will report to the presidents of their colleges, something of the work and activities of the Society. I, therefore, wrote to a number of college presidents, and I found none of them were willing to respond. They apparently had no conception of the purpose and function of an institutional member or delegate. It was then up to me to get these papers elsewhere, if possible. I, therefore, called on Professor Norris, who was responsible for this institutional membership, and Professor Chatburn. Professor Norris responded with a paper on the value of institutional membership, and Professor Chatburn with a paper on the duty of the institutional delegate. With your permission I will read the paper Professor Norris has prepared.

Institutional Membership in the Society.

The plan of inviting institutions to join the Society as such in addition to their indirect membership through members of their faculties was independently suggested by the Committee on College Administration and the Secretary at the Minneapolis meeting. After consideration by the Council the decision was reached to take the steps necessary to permit such

membership. This was done in regular form and nearly fifty institutional members were enrolled during the year following. At the Princeton meeting many of these were officially represented and two meetings of the delegates were held.

The primary purpose in initiating institutional membership was to bring about a closer relation between the Society and the institutions in order: (1) that the results of the Society work might be brought more directly to the attention of the teachers and administrative officers who were not in touch with it; (2) that the institutions might be brought to look upon the Society as their servant in matters affecting the general educational welfare; and (3) that the publications of the Society might be freely distributed in college libraries and administrative offices in order that they might be easily available for reference.

The theory was that a delegate would be selected to represent an institution with the explicit or implied understanding that he would go to the meeting with a sense of responsibility for getting out of it all that it contained for his institution, and that he would see that the lessons of the meeting were brought to the attention of the proper persons on his return. The general principle seemed to be recognized as correct as was evidenced by the large enrollment of institutions, and the delegates to the Princeton meeting in general expressed hearty approval of the plan.

The delegates came to Princeton with only a general idea of what their functions were but they earnestly desired to take something home that would be of service and would justify their appointment to the honorable posts which they occupied. The delegates first had to "find themselves" which they endeavored to do at a preliminary meeting at which they discussed points such as those mentioned above. At a final meeting they discussed the lessons of the convention in a way that was most helpful and inspiring. They presumably reported the meeting to their respective presidents, being provided, about midsummer, with proofs of the parts of the September

BULLETIN containing the minutes of the meeting. There was evidence during the year that the delegates were heard from in their home institutions.

Some fear was expressed at first that the delegates would form a clique within the Society, making an undemocratic division of the membership. This idea was promptly dispelled when the purpose of the institutional representation was explained. As the delegates had no power to commit any institution to any action it was plain that they had no functions besides those mentioned earlier. What they were appointed specifically to do any member could have done before and undoubtedly a few did. The meetings of the delegates were open to all. There was nothing, therefore, to cause the formation of a clique.

No very remarkable results were to be expected from institutional membership. The most that could be expected was a more immediate application of the results of the meetings and a more general appreciation of the Society on the part of college faculties. It is difficult to define the effects of membership of a college in the Society as a college in addition to personal representation through faculty members, but I claim that there are such effects. Official recognition of the Society enhances its standing with individuals. Familiarity on the part of administrative officers with faculty problems promotes a spirit of coöperation. Recommendations of the Society are bound to have more weight with member than with non-member institutions.

The institutional membership fee was made nominal in order that it would be plain that individuals were not trying to force the financial burden onto the college treasuries. And even with this low fee, three full sets of publications were to be furnished so that the general and technical libraries and the president's office might be supplied.

My suggestions for the gatherings of the institutional delegates at Ames are these:

(1) That reports be heard from last year's delegates, verb-

ally or by letter, stating frankly what have been the results of last year's institutional representation;

(2) That some discussion be had on the topic "What an Institutional Delegate Can Do for His Institution";

(3) That the delegates consider what subjects could be taken up by the Society which would help the institutions as such;

(4) That, at the closing meeting (as last year) the delegates bring out those points and lessons which can be most profitably carried back.

The time available for the meetings of the delegates is so short that an elaborate program is undesirable. If but two or three useful suggestions are received by each delegate the effort will have been worth while.

HENRY H. NORRIS.

In the discussion of institutional membership at the Minneapolis meeting, the impression was left that institutional membership might lead the institutions to send official delegates to these conventions and to pay the expenses of these delegates; and it was urged that in that way there would always be a representation on the part of the different institutions of the country."

DISCUSSION:

F. L. Bishop: It might be interesting to know that a number of institutions have sent delegates to this meeting at the institutions' expense, and a number have written with regard to this matter saying that hereafter this item would appear on their budgets. It is quite a strong movement on the part of educational institutions.

P. F. Walker: It seems to me there is considerable importance in this movement that will make it worth while to contine this form of membership, and it appeals to me that we may, if we wish, proceed to make these conferences of real value. I believe that the subject of research is sufficiently recognized in our schools with reference to the bearing of research upon

educational problems, that it is one topic we might discuss with some profit. I, therefore, make a motion that we lengthen the time allowed for these meetings. The motion being regularly seconded was put to a vote and carried.

WEDNESDAY, JUNE 23.

The second meeting of the Institutional Delegates was called to order at 11 A. M. by Vice-President Richards, who said, "On Tuesday we listened to the reading of the paper by Professor Norris on 'The Value of Institutional Membership.' This morning we are to hear a paper by Professor G. R. Chatburn on 'The Duty of the Institutional Delegate.'"

THE DUTY OF THE INSTITUTIONAL DELEGATE.

BY GEORGE R. CHATBURN,

Professor of Applied Mechanics, The University of Nebraska.

The writer is under the impression that one of the principal objects of institutional membership is to interest the presiding officers of colleges and universities in the affairs of the Society for the Promotion of Engineering Education; and that under normal conditions these officers would be the institutional delegates. If the president, or officer corresponding to the president, finds it inconvenient to be present the delegateship would naturally fall to the dean of engineering. Now, it would hardly be appropriate for the writer, who holds but an ordinary professorship, to explain to these high dignitaries their duties when acting as institutional delegates. Any such intention is hereby abjured and those august personages may, if they desire, close their windows and draw their blinds while this paper is being read. The chairman very frankly told me, when he asked me to write upon this subject, that he had sought diligently for a bigger man than I for the purpose but without success; no college president would undertake the task. Therefore in tendering to me this great privilege, while he did not say so, no doubt, he had in mind the adage, "Fools

rush in where angels fear to tread." So this effort in compliance with the chairman's request to write a very short paper on "The Duty of the Institutional Delegate," it should be remembered, is directed simply to those who do not bear exalted titles.

In mentioning the duties of the institutional delegate it has seemed to me best to arrange them under three subheads: before, during and after the annual meeting; and to give them somewhat categorically, leaving the discussion largely to others.

Before the Annual Meeting.

To familiarize himself with the needs and desires of his own institution. He will thus be enabled to know to which portion of the program and to what other things he would best give especial attention.

To familiarize himself with new methods and practices in his institution, and, if possible, with new ideas in the minds of the faculty members even though they have not been put into execution.

To use his influence to secure papers for this Society by having those responsible for these ideas, methods and practices to write them up for the benefit of the society as a whole.

To bring before his own faculty, and especially the local members of the Society, questions of policy and interest to the general Society. Such for example as those sent out by Secretary Bishop to the several members of the Council.

During the Annual Meeting.

To observe carefully the program and take notes of those papers and discussions of interest to his own institution.

To attend the meetings of institutional delegates, lending aid and information to his fellows and deriving aid and information from them.

To present to the Society pertinent ideas and practices of members of his own faculty, providing they are not otherwise presented. These should be clearly and concisely set forth.

A few well-chosen words are better than many scattered and rambling.

To ascertain through conversation and otherwise the practice of other institutions regarding questions under discussion during the year in his own.

To extend his acquaintanceship and note especially the personality of men available for positions in his own institution.

To represent generally his own institution as an attorney by looking after its interests whatever they may be and whenever and wherever deemed necessary.

After the Annual Meeting.

To make a brief report to the administration of his institution, touching in a general manner the most salient features of the convention.

To make at the opening of the fall term a more detailed report to his engineering faculty at a meeting called for that purpose. If other members have attended he could very properly assign to them separate parts of the convention to cover, thus a more interesting symposium could be held. At such time or times discussion should be elicited on the ideas brought from the convention, thus fixing in the minds of the non-attendants thoughts and methods advanced for the betterment of instructional, laboratory and administrative work. Such meetings might well grow into a local chapter of the Society, as has been the case at the Kansas State Agricultural College, for the purpose of reviewing the BULLETIN and PROCEEDINGS and discussing the papers appearing therein. Perhaps stated meetings of a faculty would be advantageous in other directions.

To represent during the school year following the annual meeting the general society in his own institution. He being the person to whom the officers of the Society could turn for information concerning, or to whom they might send information for distribution to that institution.

To furnish news items, or procure someone else to furnish them, to the Bulletin. Short notes on methods, devices and

kinks are always acceptable to the editors and interesting to the readers.

To bring the general Society as fully as possible before the faculty of his institution by calling the attention of non-members to articles in the *Bulletin* or papers in the PROCEEDINGS which might interest them.

To encourage members to attend the annual meeting by bringing back to them its enthusiasm and showing them the advantages both to themselves and the institution of attendance.

It is not thought that the preceding includes anywhere near all the duties of an institutional delegate. One mind could scarcely in a short sitting, or even in several sittings, hope to gather together all things pertaining to the subject. However the above may serve as a basis upon which to start the discussion.

PER CONTRA.

Last year, on the porch of the commons at Princeton, the writer remembers overhearing a discussion in which one side contended that institutional membership was the entering wedge of trouble. That it would mean a division of the society into classes and cliques. That the harmonious and splendid democracy of the past twenty years of the society's history would be broken down; and in its place we should have patricians and plebeians, nobility and commonalty, masses and classes, aristocrats and democrats, *haut monde* and *hoi polloi*.

If this should be the case, that recognizing institutional delegates as different from the ordinary members will create caste, then it may be the duty of the institutional delegate to shrink up into such a fine point that he could only be seen with a microscope.

DISCUSSION.

G. C. Anthony: Although the idea of the institutional membership did not appeal to me previous to the Princeton meeting, I am thoroughly convinced that it will be a most im-

portant medium for extending the influence of the Society and coördinating our work with that of the institutions represented. I believe that much of the present success is due to Professor Jacoby, who was then Vice-President of the Society. He arranged the schedule for the meetings and presided at them.

The delegate from Tufts was Professor Conner, assistant professor of civil engineering, and he presented a very comprehensive report covering most of the details of the meeting, presenting it first to the president of the college, and later to the engineering faculty. This has since been published in the BULLETIN of the Society.

The formality of the appointment of a delegate by the college, and especially the defraying of his expenses, carries with it obligations which should insure much more than a perfunctory attendance at meetings and enable the influence of the Society to permeate the faculty of the school represented, as was the case at Tufts. I do not believe that it would be wise always to consider the dean of an institution as the logical representative, but the delegate should have a general knowledge of the administrative details of his college, and its needs. His duties should be clearly defined and should include the reports to his president and faculty. I think, too, that he should, if possible, express the spirit of the meeting, if it is sufficiently distinctive to be indicated.

It is unfortunate to have this meeting of delegates conflict in any way with the regular meeting, and I hope that this work of the Society may develop into a separate section with independent aims.

I believe that institutions should defray the expenses of the delegates, as has been done in the case of the representative from Tufts at this and the Princeton meetings, since it will increase their interest in securing the full benefit which should be derived from such representation.

J. H. Leete: Owing to the fact that many of us are interested in the papers which are being presented at the general

session, I suggest that hereafter the meeting of the institutional delegates be set at a time which will not conflict with the general session.

C. E. Magnusson: An institutional delegate of this Society is to be compared with the section delegate of the American Institute of Electrical Engineers. I would suggest that a delegate get instructions from the faculty of his institution before going to the meeting, and that topics for faculty discussion be culled from the meeting for use at the institution.

Calvin H. Crouch: I have been much interested in the remarks of several of the speakers, especially those relating to the expenses of the institutional delegates which are borne by the institution represented. I infer from the remarks that there is a wide difference in the practice of different institutions in this respect. I was interested in learning that some institutions defray all of the expenses of their delegates while others pay nothing. I believe a discussion of this subject or statements of what the various institutions are doing in this respect, would perhaps be valuable, as the discussions might perhaps be used advantageously by those representing institutions which pay nothing toward defraying their expenses. It is possible that some institutions hesitate to pay anything toward defraying such expenses because they do not care to establish a precedent or because they do not know the practice of other institutions.

If an institution derives any benefit from having a delegate at such a meeting as this, then it would seem but fair for the institution to stand a part of the expenses of the delegate. Just what proportion of his expenses should be borne by the institution and how much by the delegate is an open question about which there might properly be a difference of opinion, but it would seem that an institution would be justified in defraying at least a portion of the expenses of its delegate to this meeting.

Inasmuch as I was interested in learning what several institutions were doing in this respect, it occurred to me that

others might be interested in learning what the practice of the University of North Dakota is in this respect. I am not aware that the university has any definite policy in regard to such matters but in several instances where it was thought the university was sufficiently interested to have a representative, the university has paid a portion of the expenses of the delegate, an amount sometimes equal to the car fare, the portion borne by the university varying with the benefits anticipated from having its representative at the meeting. I believe it is the policy of the institution not to defray all of the expenses of such a delegate for it is thought that the delegate derives some benefits from attending such meeting and should, therefore, bear a portion of the expenses. As regards this meeting the university agreed to pay an amount not equal to the traveling expenses but sufficient to encourage one to accept the appointment as a delegate and attend the meeting.

P. F. Walker: I wish to say a word relative to two matters affecting the type of organization which might be decided upon. A point which has been mentioned is that a delegate in session might give time to discussion of administrative matters at the several institutions. This would seem to call for delegates who are either administrative officers in the schools, or others who are close to those administrative officers. Another idea which has been presented is that in order to advance the interests of the Society at the several institutions, delegates should be chosen with the view of interesting different members of the faculty by making possible their attendance at the annual meetings. These two ideas conflict in some degree, and it would seem necessary that we should give consideration to them.

In order that we may proceed without delay in the determining of these conditions it seems to me wise that a committee should be appointed to consider all the questions which have been under discussion and report at the next meeting of delegates. I, therefore, move that a committee of three be appointed by the Chair for the purpose of formulating plans

for work and recommending a form of organization, this committee to report at the next meeting of delegates. This motion being seconded was put to a vote and carried. The Chair then appointed P. F. Walker, chairman, O. V. P. Stout and G. C. Anthony to bring in this report.

THURSDAY, JUNE 24.

The final meeting of the Institutional Delegates was held at 4 P. M., with Dean Anthony in the chair. The meeting was held at this time because of the necessity of cancelling the Friday meeting, in order that some of the delegates might leave on the noon train.

Dean P. F. Walker read the following report:

The Committee appointed to recommend a form of organization and a general outline of the duties of delegates, begs to report as follows:

1. That the delegates constitute a committee of this Society and that the President shall appoint one of the Vice-Presidents to act as Chairman. The Chairman may appoint a secretary and a sub-committee. (We leave the matter there with the word "may." We are not ready to advise at this time as to whether we should have a separate secretary, or whether the work may all be done through the Secretary's office, without inconvenience.)

2. The delegates in attendance at any meeting shall continue as members of the committee for one year thereafter, or until their successors have been appointed by the heads of their respective institutions.

3. This Committee shall give consideration to all matters pertaining to engineering education as may be referred to it by the Committee on Committees.

4. The Committee shall meet in special session at times provided by the Program Committee in charge of the annual meetings for the discussion of all matters coming properly before it. At any such meetings attention may be given to such matters pertaining to general policies of engineering

schools as may be considered by it to be appropriate. When these discussions lead to the formulation of suggestions or recommendations to the several institutions the matter shall be reported to the Council, and any such suggestions or recommendations presented to the Council are to be in the name of the Society.

It is further recommended that the Secretary of the Society inform the several institutions that it is the desire of the Society

(*a*) That when possible, each institution should be represented by its administrative head;

(*b*) That when the administrative head is unable to serve he should appoint from the engineering faculty, a representative who is conversant with the general policy of the institution and that such representative might properly be either a teaching or an administrative member of that faculty.

It is recommended also that the Secretary of the Society send to each institution a statement of the duties of the delegates as outlined at this meeting.

The main purpose shall be to consider the means for extending the influence and helpfulness of the Society through institutional membership.

In view of the fact that it seems best to defer formulation of a statement of duties of delegates until the Chairman has had time to secure written reports from the individual delegates, no further recommendations as to specific lines of work during the coming year are made at this time.

Under the direction of the Chairman of the Institutional Committee, and with the coöperation of the Secretary, copies of the two papers read will be sent to each member of the Society and it is expected in this way to receive statements of the duties of a delegate. These could be then reduced to a definite statement of the duties.

This report having been regularly moved, seconded and put to a vote, was received and adopted as read.

DISCUSSION.

C. L. Cory: I should like to ask one question, and make one suggestion. I understood, as the report was read, that there was to be sent to the several institutions represented here, certain information with reference to this Committee. I merely ask this: to whom will it be sent? To the president of the university, or to some other person?

F. L. Bishop: The Committee on Committees decided, I think, that the delegate should be the official representative of the Society at the institution for the coming year.

C. L. Cory: I would suggest that it would probably be covered somewhat better if this were done; that the official documents should go to the heads of institutions, but that the men sent as delegates should receive copies of all these papers. In that way we are covering it somewhat more completely. There is just one more thing. It seems to me it would help to add to the number of institutional members, if something of this kind were sent to all the institutions covered by the membership to show the intention of this Committee of the Society.

F. L. Bishop: The Committee on Committees, I believe, has assigned to the Committee on Statistics the problem of determining just exactly the schools and institutions from which we shall secure data as to the institutional members, etc. Dr. Mann stated yesterday that there were possibly one hundred and twenty or twenty-two institutions in this country that might be classified as engineering schools. If we are to carry on the work of this Society effectively, in gathering information along different lines and in preparing it, we should have a specific list of institutions. We could send to this list all the information necessary and gradually more institutional members would be included. I should like to emphasize the thought that in sending out this information to institutions, it is rather important to send it to someone who is interested in the work of the organization. In many cases the president's office would pigeonhole it, and it would get no quick response.

G. R. Chatburn: It seems rather a significant coincidence that the Committee on Committees and this organization should have decided on exactly the same thing, and, therefore, it augurs as a good omen. You will remember that one of the duties of the institutional delegates, which I outlined for you, was that the institutional delegate should be the official representative of the institution after the meeting and until his successor was appointed. I think he is the one who should receive all communications pertaining to this committee. If it is thought wise to send it also to the president of the institutions, that should be done.

C. E. Magnusson: Did the Committee on Committees consider whether the institutional delegates might be members of the Council, or should they be separate? You might have practically two committees of the same men, with only a few additional men here; while if they could be kept separate, in cases where an institution is represented by a man in the Council, they would have two men here. Was that considered or would it be of importance?

P. F. Walker: I would say with reference to that point that that it seemed almost impossible to control it. We felt that this one point here was quite important; that word should be gotten in some way to the president or chancellor of the institution that, when possible, his institution should be represented by him at the annual meetings. If you put that up first to the president, as a matter of courtesy, because the institution as a whole holds the membership, then it seems almost unnecessary to advise him that if he cannot serve as the delegate, he should appoint someone else.

Regularly moved, seconded and carried that this report be transmitted to Council as a recommendation of the committee.

There being no further business to come before the meeting, the balance of the time was devoted to discussing the impressions made upon the different ones present, by the convention which was nearing a close.

G. R. Chatburn: As I have been somewhat on the inside,

I want to say that to me the principal thing I have noticed is the change that is coming over this organization. Heretofore we have devoted our time largely to the reading and discussion of papers brought in by the members. Now a different feeling is coming over the organization, in the appointment of the Committee on Committees, and this Committee in a way outlining to the several other committees what they want them to bring in next year; so the idea will be that in the program for the following year there will be probably fewer papers, but more committee reports. The work of the committee during the year will be largely devoted to finding out what is the present practice in the various institutions in the country along certain specific lines. It would seem as though we are going toward the point where we can do something definite, and where this organization will have more influence in the institutions of the country.

R. H. Fernald: To my mind, one of the greatest features of this organization, in which it may not be dissimilar to others, is the question of fellowship—an admirable spirit of coöperative helpfulness which we get by talking together and getting acquainted with each other, as we have common problems all over the country. To my mind, along with that which has just been suggested with regard to committee reports, it would seem to me that possibly a little more opportunity might be given for an informal getting together, which would, perhaps, be as helpful as the presentation of so many papers on subjects which can be read and can be taken up at other times. I was thinking of suggesting at the Council meeting tomorrow, the question of the wisdom, especially for these papers that are printed in advance, of having them reduced to a ten-minute abstract, instead of giving thirty or forty minutes at a regular session, to their reading. This seems to me unwise. I believe there would be livelier discussion and better response if some such action were taken. What we need is an informal getting together, discussion and getting acquainted.

F. L. Bishop: It might be interesting to remark here that we have half a day's session less this year than heretofore. That has always been a very strong part of this Society's work.

C. H. Crouch: I want to speak about one other point which it seemed to me that this body might take up. Oftentimes in various institutions—I know as to this in our institution—they think they want to change something, or want to investigate some point by themselves. If the institutions knew that there was a big body, an organization like this, in excellent position to investigate, and having investigated is able to give its report big backing, this knowledge would have considerable weight with the authorities. They would decide then to wait until this body takes action before they take what might prove to be premature action. I feel, as Professor Fernald does, that the association we get here, the mixing, the talking over our troubles, problems, and so forth—that this is really a large part of what we get in such meetings.

G. C. Anthony: I have personally felt a sort of undercurrent going through this meeting, a stronger current than ever before, a feeling that we were doing something besides teaching facts to students. I think it has been brought out quite strongly this afternoon, but I have noticed it from the first. I wonder if those of you who were at the Princeton meeting noted also, that there is less of the spirit of unrest here that prevailed at Princeton. I have not felt that at all at this meeting.

TREASURER'S REPORT FOR 1914–1915.

To the Society for the Promotion of Engineering Education:

The Treasurer would respectfully report the condition of the Society's finances as follows:

COMPARATIVE BALANCE SHEET 1913–14 and 1914–15.

Assets.

Accounts Receivable.	1915.	1914.	Increase.	Decrease.
Back dues	$ 607.72	$ 279.54	$328.18	
Current dues	1,389.04	1,055.22	333.82	
Advertising and publications	279.90	419.46		$139.56
Cash Lincoln Tr. Co	654.64	1,340.59		585.95
Dean Bishop	100			
Union Sq. Savings Bank	383.68	371.05	12.63	
Inventory of publications	4,047.50	3,937.55	109.95	
	$7,462.48	$7,403.41	$784.58	$725.51
			725.51	
			$ 59.07	

Liabilities and Surplus.

Accounts Receivable.	1915.	1914.	Increase.	Decrease.
Accounts payable*	$643.96	$250.00	$393.96	
Dues non-members	3.50	26.90		23.40
Members dues paid in advance	43.74	103.85		60.11
Surplus	6,387.60	6,651.61		264.01
Life membership	383.68	371.05	12.63	
..	$7,462.48	$7,403.41	$406.59	$347.52
			347.52	
			59.07	

TRADING ACCOUNT.

June 18/14.		
Inventory	$3,937.55	
Cost of Publication (Schedule D)	4,051.52	
	7,989.07	
Less Inventory on hand, June 16/15 (Schedule C)	4,047.50	
Cost of Sales		$3,941.57
		$3,941.57
Sales of Publications:		
Sales to members and non-members	575.09	
One-fourth of individual members' dues	1,376.00	
Three-tenths of institutional members' dues	143.25	$2,094.34

* There are outstanding accounts for which bills have not been presented. As far as the Treasurer's accounts are concerned such become payable only when audited.

Advertising	1,195.50	
Less discount	21.03	1,174.47
Balance—profit and loss acct., loss		672.76
		$3,941.57

PROFIT AND LOSS ACCOUNT.

Balance—trading a/c	$ 672.76
Princeton Meeting (Schedule B)	426.92
Secretary's Office Expenses (Sched. E)	3,245.33
Treasurer's Office Expenses (Sched. A)	350.96
	$4,695.97

Dues, individual	$4,128.00
Dues, institutional	334.25
Discount received	56.59
Interest on bank balances	14.56
Deficit for year	162.57
	$4,695.97

BALANCE SHEET.

Assets.

Accounts receivable:		
Members: back dues (Schedule AA and FF)	$ 607.72	
Members: current dues (Schedule BB and FF)	1,389.04	
Members and non-members: Adv. and Publications (Schedule CC)	279.90	2,276.66
Cash, Lincoln Trust Company	654.64	
Union Sq. Savings Bank, Life Membership Fund	383.68	
Dean F. L. Bishop	100.00	1,138.32
Inventory of Publications (Schedule C)		4,047.50
		$7,462.48

Liabilities and Surplus.

Accounts Payable (Schedule F)	$ 643.96	
Dues, non-members (Schedule EE)	3.50	
Members' dues paid in advance (Schedule DD)	43.74	691.20
Surplus, June 18/14	6,651.61	
Less: Dues of members dropped or resigned and accounts uncollectable	101.44	
	6,550.17	
Less: Deficit for year	162.57	
	6,387.60	
Life Membership	383.68	6,771.28
		$7,462.48

MEMBERSHIP.

No. of Men.	New: Individual.	New: Institutional.	Res. or Dropped. Individual.	Res. or Dropped. Institutional.	Total.
June 1911 1,071	114		83		1,102
June 1912 1,102	107		51		1,158
June 1913 1,158	215	44	59		1,358
June 1914 1,358	143	7	69	2	1,437
June 1915 1,437					

It will be noted that the Treasurer's accounts are kept in accordance with the following schedules, which are not printed as they are quite extensive. These schedules are kept filed for reference by members of the Society in the Treasurer's office. (AA) Back dues, (BB) Current dues, (CC) Accounts receivable for advertising and publications from members and non-members, (DD) Members paid in advance, (EE) Due non-members, (D) Printing (sundry, BULLETIN, PROCEEDINGS and reprints), drawing and engraving and editor's salary, (C) Inventory of PROCEEDINGS, BULLETIN and reprints, (B) Expenses of meetings, (E) General expenses such as postage of all kinds, telegrams, advertising of publications, expressage and freight, clerical assistance, insurance, committee expenses, Secretary's salary, etc., (A) Expenses of the Treasurer's office, (FF) Current and back dues of Institutional members.

Respectfully submitted,

W. O. WILEY,
Treasurer.

REPORT OF SECRETARY FOR 1914–15.

The growth of the Society during the past year has been normal. As a part of this report there is included a table showing the membership at the beginning and end of the fiscal year.* The large number who have been dropped during the past year is accounted for largely through the resignations of those who have joined the Society but who are not particularly interested in the work. They are mostly consulting or practicing engineers in commercial companies.

The increasing importance of the Society is well illustrated by the fact that it has been asked to be represented on various national committees, among which are The National Association of Technical Secretaries, of which the Secretary of your

* See page 23.

Society is first vice-president; The Committee of the Classification of Technical Literature, of which your Secretary is a member. The Society has also been asked to join the Pan-American Engineering Congress to be held in Washington next December. The Society was represented by the Secretary at the fiftieth anniversary of the founding of the Worcester Polytechnic Institute; at the installation of President Goodnough of Johns Hopkins University, and President Bumpus of Tufts College.

One of the notable facts of the year has been the establishment of the first section of this Society at the Kansas State Agricultural College, with Professor Conrad as Secretary. The object of this Section is the discussion of the papers appearing in the Bulletin and other subjects of general educational interest, and to submit papers and discussion to the Publication Committee for use in the BULLETIN.

Bulletin. An extra number of the BULLETIN containing the twenty-year index of the PROCEEDINGS was published in August. The work entailed on this was done at Ithaca under the direction of Mr. A. C. Stevens, former assistant to Secretary Norris, and great credit is due him for the efficient way in which he conducted the work. Very few corrections or additions have been noted.

The Publication Committee during the year has endeavored to supply college notes in each number of the BULLETIN, of general information and interest to the members of the Society. It has also endeavored to supply at least one paper in each number of a general nature on the different phases of educational work and one on laboratory work. Many of these have been illustrated and have brought forth a large amount of discussion. There are many more papers submitted to the Publication Committee than is possible to publish. It does not seem possible under the present system, to increase the size of the BULLETIN very materially. It is probable that the number of illustrations will be increased, thereby giving added interest to the papers.

The volume of the PROCEEDINGS of the present year, was edited by the former Secretary, Professor Norris, and was printed on thin paper, thus making the volume easier to handle and at the same time reducing the postage, thus insuring a considerable saving.

A small booklet was issued early in the year giving some facts concerning the Society, together with reasons for becoming a member.

The question of back dues is becoming a pressing one. It is impossible to conduct the work of the Society unless its members pay their dues promptly. Most of these amounts arise from negligence. While it is a very small item to many members, the total is a very large item to the Society.

The Special Membership Committee appointed from institutions west of the Mississippi River and Illinois and Wisconsin, consisting of Deans Stout, Shenehon, Richards, Walker, Richter, Covell, Spence and Professor Spalding, have done excellent work in increasing our membership from those institutions.

F. L. BISHOP,
Secretary.

ADDRESS OF WELCOME ON BEHALF OF THE IOWA STATE COLLEGE.

BY RAYMOND A. PEARSON,

President of the College.

President Marston, Ladies and Gentlemen: I sometimes think an address of welcome is superfluous. If there is one place where the old adage, "Actions speak louder than words," is true, it is on an occasion like this. But I shall go through the formality of saying how welcome you are here. We are very glad to see you. We consider it an honor to have you with us. Our committees have been working hard for some weeks in anticipation of your coming, and we sincerely hope that you will find things here to your liking, comfortable and convenient, so that when you go away, you will look back upon this meeting as one which was well arranged in advance, in so far as the institution itself could do these things. I hope none of you will have occasion to reflect upon the meeting as a friend of mine did who attended a convention in a small city some time ago. The rates at the hotel were two dollars on the second floor and two dollars on the third floor; and during the week of the convention there was a special rate of two dollars on either floor.

As everyone of you knows, this is the land-grant institution of the state of Iowa. This institution, in common with others of its kind, has been experiencing a considerable growth in student enrollment in the last few years. I am going to take a few moments of your time to tell you something about the college, not that I think you do not know about it, for many of you are connected with other land-grant institutions; but here you are, on this ground, and I shall give you just a few of the high points, if you like.

Our total student enrollment last year, excluding summer

session, was over twenty-seven hundred. About twenty-three hundred of these were in collegiate courses, the remainder being in what we call sub-collegiate courses. Students may be admitted to the sub-collegiate course if they have not finished the high school, though they must have finished the grammar school. The four hundred sub-collegiate students were mostly in agriculture, though some were in short courses in trade school work where we are preparing young men to take places as stationary engineers, and positions of that character. Of the nearly twenty-three hundred students in the four-year courses, about half are in agriculture, and the majority of the balance are in engineering. There are between seven and eight hundred in the collegiate and sub-collegiate engineering courses. We have about six hundred students in home economics, and about one hundred each in veterinary medicine and in science as applied to the industries.

The student enrollment in the last two years has increased practically seven hundred—the exact number is 681—mostly in the four-year courses. This increase is largely in agriculture and home economics. The engineering attendance has decreased year by year recently, as has been the common experience throughout the country; but the tide has turned and the enrollment this year is the largest in our history. Engineering attendance is again on the up-grade; and perhaps we are doing pretty well when I remind you that there is also a strong engineering college in the State University at Iowa City.

In addition to our collegiate and sub-collegiate work, we operate experiment stations in agriculture and engineering, and we are carrying on investigations in reference to animal diseases. Then, too, we are conducting extension work and this state has been generous in respect to this work. Last year the state gave $90,000 for extension work in agriculture and home economics. Recently we have started extension work in engineering. This includes short courses held in different

parts of the state, somewhat along the lines developed in Wisconsin.

We have at this institution profound respect for the engineer and we have a great desire to promote his interests and the interests of engineering in all its aspects. Our lines of engineering instruction are the usual lines,—civil, electrical, mechanical, mining and chemical and ceramics and recently we have established two new departments, transportation and structure design.

We think that here, more than at some of the older institutions, the value of the mental training which engineering courses offer is appreciated. We believe that for the average young man who is going into general life work, a course in engineering gives better mental training than a course in liberal arts. In saying this, I do not exclude liberal arts *in toto*, because a certain amount of that work properly is a part of an engineering course. We have here occasionally a student taking engineering preparatory to becoming a lawyer. I think this is a good fundamental training. A leading lawyer of the State had just finished work on an important case in which a great railroad system was involved with heavy damages claimed. The lawyer had on his desk a pile of engineering works and he said to me, "I would give a good deal if I could have studied engineering in place of some other things."

We emphasize another point; that engineering has value from the standpoint of culture. We have heard that farmers and engineers are not cultured. We do not believe this and will not accept a definition which necessarily carries this meaning. In our opinion, a man is cultured if he is a gentleman and can go into a community, mingle with the people and command their respect, because of the knowledge which he has and because of his ability to enter into their affairs, to see things from their standpoint and to talk with them intelligently. Then, where would engineering instruction have greater value from the cultural standpoint than in this state, or in the country?

We say to the young man in agriculture that if he really loves electricity, it may be of more cultural value to him to take a study in electrical engineering, perhaps wireless telegraphy, than to take one of the old-line cultural subjects which he dislikes. In compelling him to take the latter, we might emphasize his dislike for it. Rather than do that, we would let him take the work in wireless telegraphy, and later depend upon him to develop, in his own way, some of the other general knowledge in the useful liberal arts subjects. Likewise we say to the engineering student that if he truly likes horses, there is no reason why he should not take a two or three-hour study on caring for or judging horses.

But our great work here is along the old engineering lines. Development in this state as does the development of the country, largely involves the problems of agriculture and engineering. Here in Iowa we are producing crops valued at nearly half a billion dollars a year. We have already put in underdrainage—I think I am correctly informed—to the value of about one hundred million dollars. It is an engineering proposition and they tell me the work is only well begun. We have enormous natural resources which must be developed with the aid of engineers. Twenty-five years ago, many of my classmates in engineering in Cornell University were looking forward to going into railroad engineering. At that time railroads were being built rapidly. I suppose no state is better supplied with railroads than Iowa; they are located everywhere here because of the flat character of the country and because there is business in every part of the state. Nowadays, railroad mileage is not being increased very much, but we continue to need engineers to maintain and improve the railroads. We need other engineers to develop the state. There are large mining interests in Iowa. Our clay deposits are large. At a single point in the state the clay products shipped out amount to some trainloads daily. This is one of the great clay centers of the United States.

I must mention a hobby of mine: I am expecting the engi-

neers to develop a natural resource, the wind. I refuse to believe that that greatest natural resource is going to remain useless for all time to come. One of our earliest graduates, Dr. La Nerve Noyes, of Chicago, a man who has won great success in the manufacturing field, largely because of his investigations of and manufacture of the wind mill, is responsible for the statement that enough wind blows through a square rod to furnish all the power, heat and light on an average farm. Gentlemen, I am going to put that proposition up to you. We want the wind harnessed here in Iowa. If you could feel that resource as we do occasionally, you would appreciate better what I am saying.

Again, I bid you welcome. We feel honored; we feel flattered by your coming here; and we want to do everything we can to help make this the best meeting that this very useful society has ever held.

RESPONSE ON BEHALF OF THE SOCIETY.

BY GARDNER C. ANTHONY,

Past President of the Society.

President Pearson, Ladies and Gentlemen: I find it very pleasant to perform the task which has been assigned me, of saying a word in response to President Pearson's welcome. It is a double pleasure, first, because of the warmth and genuineness of your welcome, second, because you represent a section of this country which has been productive of the highest educational development and intellectual vigor. I say this section, instead of speaking of it as the West, because, although this is my "farthest West," in using that term I have always met with the response, "but this is not the West, you must have come from the Atlantic seaboard." Your institution lies in those meridians from which I have personally drawn the greatest inspiration, and to which I send all good men in the educational field who need to breathe the air of freedom in educational life. An eastern man, as I am, having great reverence for the institutions of the East, recognizing fully their value, and knowing that yours are built on their foundation, yet I believe you have added something to education that they never would have had; and I am profoundly grateful for it. It seems to me that one of the very important phases of the work of this Society is to bring more of that freedom into the East, especially to the Atlantic seaboard.

Finally, I thank you very much for the hearty welcome you give us, for the cordial invitation you extended to us last year at Princeton, and for its realization here.

ADDRESS OF WELCOME ON BEHALF OF THE STATE OF IOWA.

HON. A. B. CUMMINS,

U. S. Senator from Iowa.

Mr. President, Ladies, and Gentlemen of the Society: The task that has just been so graciously assigned to me by the President of your Society is peculiarly agreeable to me. It is agreeable for two reasons, at least: First, because to exercise for a moment the functions of a host is always delightful, and second, because of the very nature of things. I am relieved now of the heartbreaking and soul-crushing responsibility of attempting to say anything that will add to the sum of human knowledge. It seems to me that I have been speaking continuously for more than twenty years; and I have learned how much greater is the capacity of man to speak than his capacity for thought. The truth is that I have in all these years grown gray-haired in the effort to express a substantial uniformity of idea in a complete variety of phrase. Just at this moment, however, I am conscious of but one embarrassment; and it arises from the doubt I honestly entertain with respect to my ability to subordinate a long-continued habit to a firm and worthy resolution. For some years now I have been a member of a legislative body. Its members agree that it is the greatest legislative body in the world. That sentiment, however, is not universal. However that may be, this great body has but two methods of bringing debate to a close—that is to say, of terminating talk. The first is by unanimous consent. It is rarely given. The other is through physical exhaustion. It never occurs. The members of that exalted tribunal constantly exemplify one mighty ambition. It is, that they may make their utterances immortal by making them eternal.

You can understand, therefore, with what trepidation I arise, encumbered with a habit of this sort, and whether I can escape its influence on this occasion remains to be seen.

I think I have a fairly good title to exercise the very honorable, enjoyable position which my friend, the president of your Society, has just conferred upon me. I believe that I have some title to speak for Iowa and to interpret her thought. Nearly fifty years ago I was admitted to the membership of her citizenship. I think I may speak in a sense for your immediate host, the Iowa College of Agriculture and Mechanic Arts. For more than seven years I was a member of the board of trustees of this institution, and learned to admire it, learned to hope for it, as I learned to admire and hope for no other institution in all the land.

Professor Marston said that I have a right to speak as an engineer. Well, it is true that for two years in my early life I was a little bit of the ragged fringe of the noble cloth of your learned profession. I have a mind to tell you about that experience, if you will allow me to drop into the first person, and to indulge in a habit that only the old can safely enjoy, the habit of reminiscence.

I came to Iowa when I was a boy of nineteen. I had left college; that was all. I thought I was master of myself and master of the conditions that might confront me, but I soon discovered that I was mistaken. It was not three months until I was working at a carpenter's bench at one dollar a day. I enjoyed it, of course; it was my trade and the trade of my father. I graduated into the express office at McGregor, where I helped a great corporation to distribute, not its dividends, but its trade; and shortly after that I was offered a position as assistant county surveyor in Indiana—Fort Wayne. I had a smattering of mathematics in school, and I accepted the position. I filled it, how well I do not know. The surveyor himself was at the time division engineer on a railroad that was being constructed from Fort Wayne to Richmond, called the Cincinnati, Richmond and Fort Wayne Railway.

After I had been wandering over the swamps of the Maumee, for some months hunting for lost corners with all the zeal and industry I could summon, the engineer came to me one day and said, "I want to come back to the office, and I want you to take my place on the railroad." He had charge of about seven or eight miles then in course of construction. I said to him, "I can't do it; I know nothing about civil engineering." I knew nothing of it save the little glimpse of a great field I had received in my four years in school. "Oh, yes," he said, "you'll have no trouble whatever."

Now, I pledge you my word that I had never had a transit in my hand. I had never seen a level. The road had been located, and was just at the point of construction. The particular division to which I was finally assigned had never been cross-sectioned, although the grade, fortunately for me, had been laid upon it. I remember, as though it were yesterday, the day I left Fort Wayne, trundled down through the swamps of Indiana, and finally reached the headquarters of this particular division. There I found a body of four or five men, who were supposed to be my subordinates, who were supposed to accept or to receive orders from me with regard to what ought to be done; but there wasn't a one of them who did not know infinitely more than the man who came to command and direct them.

I slept at a farmhouse that night, our headquarters. I told the boys that I would give them a holiday the next day. That was not entirely unselfish; for there was a part of the road already built, and I spent the next day, the first day I was filling this position, walking over the part of the road that had been built, so that I could see how a railroad embankment was made, and how a railroad cut was made; so that I could once glimpse a railroad culvert, and see in a general fashion how the thing should be done. I returned, and the next morning I shouldered my level and started out. I tell you, I had never had any acquaintance with that instrument before. I shouldered that level, and took those men, and went

to work; and through the providence of things—I don't know how it happened—I succeeded in finishing the cross-sectioning of that division.

It was not long after that until I was taken to Portland, into the office of the chief engineer, or the assistant chief engineer. In a few months he was appointed chief engineer of the T. A. B. & N. Railway, and the directors of this company, in the bliss of their ignorance, selected me as assistant chief engineer. In those days it was not as it is now, when all the plans for all the culverts are uniform, and the bridges are planned in the central office, and explicit instructions sent out. The engineer in those days had to make plans for every culvert and for every bridge, for turntables and for station houses. I shall never forget as long as I live my embarrassment when it first became my duty to make a plan for a water tank. Why, I had never seen a water tank, let alone design one. I went from Portland to Ridgeville, fifteen miles away, to see a water tank, as I would have gone to see a monument of architecture.

Somehow or other that road was finished, and the next year it came about that I was offered a position upon the Northern Central Michigan, a road running from Jonesville to Lansing. It was my duty to locate that road; but I had become by that time an accomplished engineer, and I did locate the road. It was then that I discovered for the first time some of the intricacies of railroad building. This railroad was under the auspices of the Lake Shore and Michigan Southern Railway, but was constructed through the agency of a local company. The local company had entered into a contract with a minister, who had for the time being turned himself toward commerce and industry, and he was to grade the road for the local aid. The company had secured a local subsidy, and notes had been contributed by the citizens along the way, who wanted additional commercial facilities. The first real difficulty I encountered was the insistence of the contractor who was in charge of the work that I should do what he suggested;

that the road should be so located, the grade so established, that he would be able to make something out of the contract into which he had entered. It never seemed to concern the people in those days that in future times a heavy grade might increase the cost of operation, or that a sharp curve would accomplish the same purpose. I refused to yield to the contractor's demand, and although he may have known more about it than I, I insisted upon locating the road and establishing the grade that seemed to me would best answer the necessities of transportation. I was immediately haled before the board of directors and in the issue between me and this preacher-contractor, I was easily defeated. It was his interest that established the grade, and it was his welfare that determined where the road should go.

I quit civil engineering. I got just that glimpse of it, however, which enabled me then and enables me now to understand the nobility, the greatness, the worthiness of the profession of which you are members.

I welcome you most heartily to this commonwealth. Fortunately, one can speak in praise of his own State without disparaging any other. I believe that the star which shines for the State of Iowa in the blue field of Old Glory shines with a little steadier light than that which emanates from any other star in that wonderful constellation. Iowa has a great many things of which her people are proud, but the chief of them all is the character of her men and her women; the best and most enduring of them all is the disposition of the citizens of the state. I dare to say that in all the round of commonwealths, there is no state in which the problems of government are so simple as in the state of Iowa. There is no community in all the world, two millions and one half in number, so deeply law-abiding, so devoted to all the principles of exalted government as the two millions and one half, or nearly that, who compose the citizenship of this state. We have no great cities. I live in the largest city in the commonwealth, and it is a village of one hundred thousand people. Our population is rural; our interests are generally dissemi-

nated. We have no men or corporations of great wealth, but the average wealth of the people of Iowa is two and one quarter times as much as the average wealth of the people of the United States, and it is more than the average wealth of the people of any other state in the Union.

I mention this because I am part of it, and because I want you to know it. We have here 57,000 square miles of territory, and 97½ per cent. of it is susceptible of profitable cultivation, and 94 per cent. of it is at this moment under successful cultivation. There is no other such fertile field in all the world. You cannot find 57,000 square miles of the earth's surface anywhere the world round, of which so large a proportion as I have just named can be used in agriculture. It naturally follows that Iowa has a greater volume of agricultural products than any other state in the Republic. It follows that, acre for acre the state over, our farms are worth more than the farms of any other state in the Union. There may be better land than ours, but there is no state which approaches this one in the value of its farms.

Moreover, Iowa—and this touches engineering—Iowa has more miles of railroad according to its area, or according to its population, than any other state in the Union. It has more colleges according to its population than any other commonwealth.

I have mentioned these things, not at all to suggest any invidious comparison with any other commonwealth, because I know there is no state but in some respect lifts itself up above all its fellows. I have mentioned them because I want you to know that in the great mass of civilization, in this mighty age of progress, this community is doing what it can to render a good account of itself and of its people in the day of final reckoning.

Moreover, I will not say that of all the agricultural or scientific colleges of the land, that of Iowa is the best. That would be clearly invidious and discriminating. But I want to say of this institution, of which you are now the guests; as my friend George W. Perkins of New York said the other

day, in a speech in Philadelphia, of the United States Steel Corporation and the International Harvester Company. "These are not monopolies; oh, no. These great commercial and industrial institutions are simply eminent in the fields which they occupy"—so I say of the Iowa State College: it may not be the greatest, but I can confidently claim that it is eminent, if not preëminent, in its field. What I really mean is this: I am better acquainted with the work of this institution than I am with the work of any others. I know more of what it has done for us than I know of what your colleges in other states have done for you; and I would be false to my devotion to this institution if I were not to say that I think the Iowa State College has done for the people of its state more in developing the love for and heightening the dignity of agriculture; has done more to enroll the farmer in the ranks of the learned professions than any other institution throughout the whole country.

That is the great value, after all. I know there are institutions that in science, in the development of science, in research, in all those abstruse things, have possibly outreached our own. But something has endeared this institution to the farmers of this state. I think it has ennobled the work of the farmer, dignified it, and I am thoroughly sincere when I say that I think it has lifted them into the ranks of the learned professions. For nowadays a farmer has to be an engineer. I do not know what you will call him finally, what kind of engineer you will call him, but the day is rapidly dawning when the people who till the soil, and do it successfully and in competition with their fellows throughout the world, must be engineers in all that the name implies. And I think they are rapidly becoming so here.

Iowa welcomes you most heartily, and before I say a parting word, may I not congratulate you upon a thing that is foremost in my mind and that is closest to my heart. I cannot in these days confront an audience of my fellow men and women without congratulating them upon the profound peace which now blesses the republic of the United States. To me,

we seem to occupy not only a unique position in the history of the world, but we occupy a most fortunate attitude toward the most appalling disaster which ever fell upon mankind. I would not stay the progress of this occasion a single moment upon this subject, were it not that I believe that you are shortly to confront the most serious responsibility ever encountered by the American people. I do not believe that we will be involved in the war. I cannot conceive a situation which will warrant interference upon the part of the United States in the horrible conflict now laying desolate the whole continent of Europe.

But some day peace will come; some day the nations of Europe will lay down their arms; some day the voice of civilization will be heard; some day the peace-loving people of the world will have an opportunity to make their influence felt. And it is to equip you with a full sense of your responsibility when that day dawns that I have mentioned this subject. I do not know who is to blame for the war in Europe. I do not know that the blame can be imputed to any particular nation. But I want to call your attention for a single moment to the narrowness of the issue, the miserable, trifling character of the question which finally brought down upon the millions of Europe the unprecedented calamity which is now sweeping like a besom from one corner of the continent to the other. And I do this for a purpose.

Just remember that Austria made certain demands of Servia. Servia complied with these demands, save two. These two were: first, that Austria should be permitted to enter Servia and assist the Servian officials in administering the law of Servia upon certain men whom Austria charged with being instrumental in inciting sedition against Austria, arising out of the circumstances surrounding the absorption of Bosnia and Herzegovina in 1908. That was the only question; that is, the two allied questions—should Austria enter Servia and help the latter sovereignty administer her laws; and second, should Austria be permitted to name certain officials who, it was claimed, had been guilty of inciting insurrection against

Austria? That was all. It ought to have been local. I do not attempt to say whether Austria should have made the demands or not. I am not here to insist that Servia should or should not have yielded to the demands, although to have yielded to them would have been to have surrendered her sovereignty in the eyes of the world; but that was all. Because those two nations could not compose that little issue, could not determine between themselves how Servia should bear herself toward Austria, Austria declared war against Servia. Russia, feeling that her interests were involved in the sovereignty of Servia, and in the perpetuation of the Balkan integrity, mobilized her troops; and Austria declared war against Russia because she mobilized them. Germany declared war against Russia because she was afraid the troops would pass over the German frontier. Germany declared war against France because France would not agree to remain neutral. Great Britain declared war against Germany because Germany violated, as Great Britain charged, the neutrality of Belgium.

Thus the whole of Europe, and three fourths of the civilized peoples of the world, are at war. Why? Because two countries would not pause long enough, or at least one of them would not pause long enough, that the nations of Europe might sit down calmly and discuss in an amiable way these differences between Austria and Servia. Two millions or more of men have already died in order to settle that dispute; hundreds of thousands of homes have been desolated forever; burdens beyond compare have been laid, not only upon this generation, but upon generations yet to come, because that little question could not wait a single day for adjustment and discussion.

Now, do not imagine that I forget the underlying irritation of Europe. I have in mind all the great straining desire of Russia to reach the Mediterranean and the Adriatic. I do not forget how Germany, with its vast energy, developed more rapidly in the last twenty years than any nation in the world,

felt that her territory pressed hard against her beating heart. I do not forget that France was resentful because in 1871 she lost two of her provinces. I do not forget the ambition of Great Britain to be eternally the mistress of the seas. But none of these things would have brought about the war. These things have lasted for half a century. They have endured in all their strength for half a century, and yet the attitude of the nations of Europe was more kindly and friendly toward each other than for years, because Great Britain and Germany came a little nearer together in the settlement of the Balkan War than they had been in more than a quarter of a century.

Do not imagine that I am saying these things in order to weigh the fault or blame that is to be attached to any nation. I am saying them simply to impress upon you my belief that the day will come when we can broaden infinitely the field of mediation and arbitration. I am opposed to war. It is an awful price to pay for anything. It is too great a price to pay for anything save human liberty. When this war comes to an end, it will be for the United States to lead the world a step in advance toward wider arbitration and more efficacious mediation. It will be for the United States at least to lead the world forward a single stride in international law. My friends, we have not made an advance in international law in more than three hundred and fifty years. The obligations of nations to each other, as expressed by Grotius three hundred years ago, are more humane, more Christian-like, more civilized, than the obligations which the nations are now recognizing as existing between each other. We have moved backward instead of forward, and we are tolerating, or observing rather, atrocities which would have brought the blush of shame to the barbarian's cheek in the darkest ages of the world's history. The United States has assumed a lofty position. It can lead the world on, and then will come the moment which will present the best opportunity citizens of the United States have ever had to bless mankind. And I hope sincerely that in this

juncture—and I believe I ought to say it, because I am not of his political faith—I believe that the people of this country, without respect to party, without respect to opinions upon domestic policies, should as one man sustain and strengthen the arm of the President of the United States.

RESPONSE ON BEHALF OF THE SOCIETY.

F. E. TURNEAURE,

Past-President of the Society.

Senator Cummins, Ladies and Gentlemen: As one of the past-presidents of the Society, it seems to be my duty, and it is my privilege, to acknowledge for the Society the very kind welcome given to us by the state of Iowa through Senator Cummins. I think the time has come when I can also acknowledge the great hospitality which has been shown the Society by all our friends, and particularly by the college, by President Pearson, Dean Marston, and Dean Curtis.

It is not often that this Society meets on the great prairies of the Mississippi Valley, and when it does meet in the wonderfully rich basin of the United States, I cannot imagine a more fitting place than here at Ames. In the middle of these boundless prairies we get some little appreciation of the great riches of which the Senator has already spoken. It was quite fitting that yesterday the members of this Society should be shown over a portion of the prairies, so that we could appreciate better what you have here. I think the Senator and the citizens of Iowa need not be at all fearful of a foreign invasion of the State. If an enemy should appear at the Mississippi River, I imagine he would be made welcome and invited to beat his sword into a plowshare, to work this wonderful land. Or possibly, if the enemy appeard too fierce, the entire population of Iowa would be loaded into automobiles and taken over the backbone of the continent in forty-eight hours.

I want to congratulate, too, the Senator and the state of Iowa on the exceedingly fine College of Agriculture and Mechanic Arts developed here. I certainly agree with the

Senator in what he has said with regard to the development of this wonderful college. I believe personally, and I think it is the opinion of the Society, that in no state has the development of the education given by the higher institutions of learning fitted better the interests of the State than is the case in Iowa. I want to thank you again for your welcome and for your hospitality, and I hope the day is not far distant when we may have the privilege of coming here again.

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THE RELATION OF THE ENGINEERING SCHOOLS TO THE PROFESSION, THE STATE AND THE PUBLIC.

PRESIDENTIAL ADDRESS.

ANSON MARSTON,

Dean of the Division of Engineering, Iowa State College.

For many years the world has seemed enamored with engineering and industrial education. The achievements of the last hundred and fifty years in the mechanic arts have been of such wonderful and far reaching character as literally to revolutionize the material details of life, and even of intercourse between human beings, including the interchange of thought between human intellects. It was natural to assume that modern engineering had revolutionized man himself, as well as his mode of life, and had been one of the main forces which had banished forever the bloody cruelties of the past. Deep thinking men, however, understood all along that any hundred and fifty years constitute such an infinitesimal part of the millions of years of man's past and future development as to be capable of changing his real character but a little, and that he still retains much the same savage instinct as of old. Events since the memorable first days of last August have made the whole world realize this fact. We have learned, with mingled amazement and pain, and have shown that engineering, which has so ministered to happiness and intellectual progress, has also armed that fierce creature man with new weapons of unheard of frightfulness, certain to be used in the ruthless killing of women and children.

Broader Activities of Engineering Schools.

Industrial and engineering education have now arrived at a point where, in order properly to fill their functions in the

scheme of the world, it becomes necessary to enlarge their activities to include directly the uplift of man. The engineering schools must deal directly with the industrial world, the engineering profession, the state and the public, as well as with their immediate clientage of students.

"Engineering is the professional phase of mechanic arts." "The mechanic arts are those arts which are characterized by applications of the science of mechanics." "The engineer is the man who *directs* mechanic arts work."* Engineering is thus vitally connected with all mechanic arts industries, and engineering education with industrial education.

Engineering schools ought to take a broader view of their functions than has hitherto generally prevailed. They ought to fit themselves into a carefully planned system of industrial education, and to accept responsible duties of leadership therein.

Engineering educators ought clearly to recognize that engineering and industries are not in themselves ends but merely means to a great end, namely, the end of promoting the happiness, the welfare and the uplift of the world. An ingenious harvesting machine is of little worth in itself, but of much as a powerful agency in feeding the hungry. A great bridge is of note only as it represents the fruition of faithful effort and of genius, and as it lightens the task of the citizen and facilitates the intercourse of the world.

Engineering schools do not fulfill their duties by the training of "efficient" engineers alone. Human machines are but a step higher than machines of iron. The real object of the engineering schools is to advance engineering science, and so to disseminate engineering knowledge throughout the world as thereby to increase production, to diminish its cost and the cost of distribution, to promote health, convenience, safety and enjoyment, and to educate and protect every citizen in all his

* From definitions by a committee of three college presidents, four deans and one professor of engineering, and the United States Commissioner of Education. See *Proceedings Land Grant College Engineering Association*, 1914.

rights which are in any way affected by engineering principles or practice.

There are those who, naturally if superficially, would blame the European war upon our modern engineering and industrial education and system, saying, with a recent magazine writer,* "Militarism is the militant factory. The factory—by factory I mean of course our whole industrial system—is our educational system at work." Even to such critics the remedy is to broaden rather than to curtail industrial education. "We are ready to supplement manual training with man training," says the same writer.* On the other hand the bitterest accusers of Germany recognize that her wonderful strength, in peace as well as war, comes largely from her wonderful system of industrial (including engineering) education. It follows that every nation which would be a strong nation must develop industrial education effectively to develop national strength.

Thus from two widely different points of view comes strong additional support for the conclusion that our engineering schools, as our inherited leaders in industrial education, must now face wider duties than ever before recognized, and must even assume vital responsibility for the continued existence of democracy itself. Can a democratic country, without adopting militarism either in law or in spirit, develop a complete system of industrial education and organization, which shall reach effectively every workman, in fact every citizen? If our engineering schools cannot successfully serve as leaders in solving this great problem, then inevitably they must be deposed from leadership.

The Profession of Engineering.

We have inherited too narrow an ideal of the engineering profession. There was a long debate as to whether the engineer should be a "scientific" or a "practical" man, in which it has been decided that both sides were right. But we

* *The Century*, June, 1915.

have never yet fully realized the fundamental error of the unconscious assumption made during that debate, that, like the doctor and lawyer, the engineer renders merely a personal service to a client for a personal fee. As a matter of fact there are fundamental differences between engineering and the earlier recognized "learned professions." It is not specially important that engineering is not nearly so much of a closed caste as law and medicine, for the engineer is bound by the same principles of professional honor, obligation, ethics and *esprit de corps* which govern and inspire the lawyer and the doctor.

Engineering is the professional phase of the mechanic arts, in which arts hundreds of millions of men are engaged. These myriads are of all ranks,—unskilled laborers, expert mechanics, foremen, superintendents, engineers, masters—without separating barriers of caste.

In some important particulars the work of the engineer is bigger and broader than that of almost any other profession. In addition to rendering expert personal professional service, he must serve as an officer in great industrial and engineering organizations, striving, like the officer in an army, for the success of his army rather than his personal success. Above all, the really great engineer is the master engineer, who must have such great qualities of leadership that he can control men and capital, and organize great undertakings.

As an officer in some engineering or industrial organization it may even be the duty of an engineer to refrain from personal professional service in favor of some less qualified man. I have a friend who is a national authority on bridges and reinforced concrete, but who, as an ex-officio member of a state highway commission, finds it necessary to refrain from making plans for highway bridges, and, instead, to assist in developing a commission staff of bridge engineers, capable of doing successfully the highway bridge and culvert work for 2,000,000 people.

Confused by the custom in other professions of personal

service to a client, the engineering profession has in the past made the great mistake of acquiescing as a matter of course in the separation of the master and the engineer. This mistake has worked injury both to the master and to the engineer. No master can secure the greatest results through the services of men whose work must always be to him a closed mystery. As for the effect on the engineer, the separation of master and engineer has robbed the engineering profession of its greatest birthright; for the man who hires roomfulls of engineers must always occupy to them the position of superior to inferiors.

Henceforth the engineering schools should make especial effort to inculcate the ideal of the master engineer in the minds of their students, and into the spirit of the entire engineering profession. The master engineer may be a great manufacturer; a railway president or general manager, or the manager of any great department of a great railway; he may be a state highway engineer, charged with organizing the work of hundreds of engineers and thousands of road officers in work vitally affecting millions of people; he may be the chief of a government engineering service; the promoter and developer of a great hydraulic power plant or of an interurban or street railway system; he may be a great contractor; in short, he may render any *master* service in engineering lines. The characteristics of the master engineer are leadership, initiative, inspirational and organizing ability, combined with expert engineering skill.

In all ranks, every engineer should be more than an engineer. He should be an active good citizen, and assume leadership in public affairs related to engineering. There are many who decry politics to engineers. On the contrary, engineers should take part in politics, especially where the public need information and advice on engineering questions in deciding how to vote. I would like to see engineers serve frequently as councilmen and mayors of cities, as county supervisors, as governors of states, as members of legislature and of congress. Whatever may have been true of Indians at one time, a good citizen is a live citizen.

The Relations of Engineering Schools to the Engineering Profession.

The engineering schools should maintain most active and intimate relations with the engineering profession at large, and especially with their own alumni and with the practicing engineers of their vicinity. There should be not too infrequent interchange of positions between engineering faculties and practicing engineers. There should be a constant succession of visits and lectures at engineering schools by outside engineers of note. Members of engineering faculties should, without exception, belong to local and national engineering societies, and in general take some active part in their work. Engineering professors should, as in the past, continue active engineering research, and contribute freely to engineering literature. All the above is, of course, simply a statement of accepted opinion.

The author believes that the engineering schools ought to go far beyond their generally accepted practice in affording direct assistance to practicing engineers. Every important engineering school has a large amount of costly apparatus, all of which is needed part of the time for instruction purposes, but much of which could readily be devoted for part of the time to the solution of the many special engineering problems, constantly arising in the engineering practice of any region, which are unsolvable except by the aid of engineering laboratories such as the private engineer cannot hope to possess. The engineers of a region should be able to get cordial help from nearby engineering schools in such cases.

Engineering schools, by proper extension work, can also effect much in educating officials and the public as to the nature and value of competent engineering service in connection with specific public improvements, and in many cases should formally organize for work of this character.

In this work, and in the general work of coöperating with practicing engineers, the frequent publication of bulletins on

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special engineering questions, part of which should be of semi-popular character, can be made of much value.

There seem to be two points of possible irritating contact between practicing engineers and the engineering schools.

First, engineers properly object to activities by an engineering school which may amount to rendering "free" direct engineering service, such as is customarily supplied by practicing engineers. The speaker has had experience with irritation caused by unfounded suspicion of a "technical service bureau," organized under his direction by an engineering extension department. The activities of such a bureau should be restricted to educational and research work. In the case mentioned the difficulty was overcome by frank consultation with the criticizing engineers.

Second, and much more important, is the puzzling question of private work by engineering professors. Practicing engineers often complain that it is unfair that they should be subjected to competition by professors, whose salaries and whose freedom from the expense of maintaining offices and sometimes even of purchasing instruments, and whose opportunity to use students as assistants at small expense, all enable them to do outside engineering work at prices below those at which a private engineer can live. The complaint is made all the more bitter by the fact that the professor often gets the work simply because of the prestige of his college position. We cannot help sympathizing with such complaints, and fees charged by engineering professors in their private practice ought to be higher, rather than lower, than generally prevail. Furthermore, students and employers of young graduates often complain that their professors who engage in outside work are thereby prevented from devoting themselves to their classes, which are often turned over to young and inexperienced assistants.

On the other hand, it is manifestly impossible to teach engineers properly without using engineers for teachers. To say that the teacher shall have no connection with actual engineer-

ing work is to say that he shall not be, or at least not remain, competent to teach engineering. Often too, the engineering professor, because of his official position, may be the only available engineer who can render the service desired.

To refuse engineering professors all chance to actually practice engineering seems really absurd. They need to do some practicing to prove to their students that they are competent.

Then, too, an engineering school not infrequently secures for its students instruction on some special branch of engineering by a man of higher grade than it could afford except by allowing him to earn part of his remuneration outside.

Outside work by engineering professors should not be forbidden, but it should be so closely regulated and controlled according to just principles as to free it from all just criticism. In formulating rules for the regulation of outside work the authorities of engineering schools would do well to confer in the frankest manner with the practicing engineers interested, both individually and through their society officers.

Regulations controlling private work by engineering professors might perhaps provide: (1) that no private work shall be undertaken of amount or character to injure college work in any way; (2) that private work will be permitted when of such character and amount as actually to benefit college work; (3) that all the circumstances of private work by professors, including the total amount, the prices therefor, and the methods of obtaining work, shall be such as not to constitute any injustice to engineers in private practice; (4) that, in order to permit proper administration, formal permission shall be secured in advance from a designated college authority for private work in each instance and permanent records of such work filed.

The Engineering Schools and the State.

The relations of the engineering schools to governmental organizations are of great and growing importance. It is easy to see that state supported engineering schools are under

special obligations to the state. Even in the case of privately endowed schools, and independent of the means of support, engineering schools are such a vital part of the general educational system as to impose binding obligation to comply with the general plan.

The movement for the passage of laws licensing engineers seems bound to prevail in the end, and, if successful, would seem certain to bring about, as a corollary, state inspection and classification of engineering schools. Certainly the state has a right to demand of all engineering schools that their graduates shall be thoroughly trained and competent.

In addition, the state has a right to demand that the engineering schools fit efficiently into the general system of industrial education. In the industrial army the engineers, the professional experts, are the educated officers. Hence the engineering schools must be the West Points rather than the drill barracks, and cannot properly be trade schools, which must educate hundreds of thousands instead of thousands, and teach an elementary instead of an advanced course of study.

Trade schools, moreover, must be local in character, designed mainly for the education of boys of fourteen to sixteen years of age, living at home. Trade schools must also provide, by evening classes and otherwise, some trade education for mechanics, who in addition to living at home are also earning their livings by working daily at their trades. All attempts to develop trade schools which are not essentially quite narrowly local in character have been comparative failures, with attendance insignificant in view of the numbers needing the training. Trade school work must be carried to the workman, for the workman cannot go to a distant school.

Nevertheless the state has a right to demand from state supported engineering schools, and to expect from others whose resources permit, some active and effective assistance in educating workmen, and in carrying technical information to public officials and to the public itself. The engineering

schools can render service in these lines which is beyond the resources of a local trade school.

The most effective organization for such work is an engineering extension department. An engineering extension department can assist the local trade schools by lectures and special short courses by high grade experts; can offer to mechanics correspondence courses at home under actual personal supervision by instructors at intervals; can provide "short courses" of a week or more for painters, telephone operators, carpenters, stationary engineers, and other mechanics, at which the advanced features of their trades can be demonstrated by their best trade experts; can, through a technical service bureau, carry educational technical information concerning specific public improvements directly to the officials in charge; can offer technical lectures to high school students and to the public; can provide automobile and other technical institutes at convenient points around the state; can publish popular bulletins on technical subjects of general importance; and can do much other valuable work beyond the resources of local trade schools.

Engineering schools ought immediately to begin to provide special courses for the training of teachers for trade schools, and it would greatly benefit engineering professors and instructors themselves to give them special training in pedagogy. Competent, specially trained teachers will be one of the most important essentials in the development by the state of an adequate system of industrial education.

The state has also the right to demand from state supported engineering schools effective scientific assistance in the development of its industries. Such assistance can most effectively be rendered through the medium of engineering experiment stations, devoted especially to the scientific investigation of the technical problems of their separate states. Such stations are already rendering invaluable service, which is provided for in no other way in America.

The Enginering Schools and the Public.

It has sometimes seemed as if there were a tendency for some engineering educators to feel that about the only duty they really owed to the public was to induce it to send as many engineering students as possible to their particular engineering schools, yet there is vital need for the widest dissemination among all the people of correct elementary ideas on engineering subjects, and for the education of public opinion to correct views on the general policies of the public and the state toward engineers and engineering. In democratic countries, and even in autocratic in the end, the public is the final arbiter on engineering as well as other questions. Whether the advice of engineers is accepted or not, and whether their services are used or dispensed with, depend ultimately on whether the public holds correct views on engineering questions. We are constantly railing at its mistakes. Why not turn in to help educate it aright?

Then, again, in many phases of engineering work the ultimate success must depend upon the engineering intelligence of the individual citizen. This is true of heating, lighting, sanitary and mechanical conveniences in the home, of machinery for the farm, of vehicles for the roads, of the use and misuse of roads, pavements, sewer and water works systems and public utilities generally. The same Mayor of Chicago who just gave such excellent service in stopping the street car strike, was reported in *Engineering News* of almost the same date to have said "We are glad to have lots of water and waste it, for it makes Chicago a cleaner and healthier city." Unfortunately there is no hope that the editorial of *Engineering News* on the utterance will be read by the citizens who control the mayor who controls Chicago's engineers.

It is the duty of the engineering schools to educate the public along correct engineering lines to the extent of reasonable possibility. Members of the engineering faculty can do something by lectures and newspaper articles. Graduates can be inspired to take active part in public discussions.

Those engineering schools which maintain engineering extension departments and engineering experiment stations can do especially effective work in the education of the public. Besides the wide distribution of popular technical bulletins, the press of the state can be utilized effectively by the systematic publication of short dispatches on engineering subjects. In the case of contemplated public improvements, addresses by college experts to meetings of citizens affected are often in much demand. A large correspondence with individual citizens on technical questions may be developed and made of great value as an educational agency.

Wider Horizons for Engineering Educators.

In this address it has been the intent to present strongly the view that the college walls of the engineering school ought to inclose the world, that the engineering educator ought to play a man's part in the wide activities of a man's world, that there will be little place in engineering education for the man or the school content with the comfortable routine of the class room and the enjoyment of scholarly retirement. Wider and more important opportunities are before the engineering schools than ever before. The very welfare of the country rests on them in important degree.

It would not be fair to present this view without saying that in the wider activities advocated much will be encountered which is unpleasant as well as much which is inspiring. The mistakes of engineering professors who take part in the wider activities will become known to the public instead of only to the president; and the institution will suffer instead of only the student. Even the best work will often make enemies. Those for whom the best work is done will often misunderstand. Selfish interests will be encountered, and will fight if the college work is really effective.

A Wisconsin university, whose professors have served effectively on many commissions, whose extension departments have taken an active part in shaping industrial education,

whose faithful and effective work has aroused at the same time antagonism from selfish capital and from uninformed consumers, may even be compelled to pass through trying times of political misrepresentation, of formal investigations. But the great work she has done will stand the tests. Why should not such work be tested? Engineers specify tests.

One engineering educator engaged extensively in the wider activities, has carried in his pocket for two years the immortal words of Kipling:

If you can keep your head when all about you
Are losing theirs and blaming it on you;
If you can trust yourself when all men doubt you
But make allowance for their doubting, too;
If you can wait and not be tired by waiting,
Or being lied about don't deal in lies,
Or being hated don't give way to hating,
And yet don't look too good, nor talk too wise;

If you can dream—and not make dreams your master;
If you can think—and not make thoughts your aim;
If you can meet with Triumph and Disaster
And treat those two impostors just the same,
If you can bear to hear the truth you've spoken
Twisted by knaves to make a trap for fools,
Or watch the things you gave your life to, broken,
And stoop and build 'em up with worn-out tools;

If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them, "Hold on!"

If you can talk with crowds and keep your virtue,
Or walk with Kings—nor lose the common touch,
If neither foes nor loving friends can hurt you,
If all men count with you, but none too much;

If you can fill the unforgiving minute
With sixty seconds' worth of distance run,
Yours is the Earth, and everything that's in it,
And—which is more—you'll be a Man, my son!

I believe utterly in the ability of engineering educators and of engineering schools to meet fully the responsibilities and to perform ably the duties of the widest activities proper in engineering education. I believe in the numerous existence of the master engineer among engineering educators, the men of initiative, and of leadership. I believe in holding the ideal of the master engineer before the engineering educator as before all engineers.